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ARCHIVES OF PEDIATRICS.

A MONTHLY JOURNAL DEVOTED TO THE
DISEASES OF INFANTS AND CHILDREN

FOUNDED IN 1884 BY WM. PERRY WATSON, M.D.

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VOLUME XXVIII.
JANUARY TO DECEMBER

1911

E. B. TREAT & CO. PUBLISHERS

241 and 243 West 23d Street
NEW YORK

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ARCHIVES OF PEDIATRICS

JANUARY, 1911.

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

NINETEEN HUNDRED AND ELEVEN.

"The new year reviving old desires."

Whatever the moralists may say regarding the necessity of making every day a review of past deficiencies and the starting point for good resolutions and a better life, few of us stop in the course of the busy days we lead to contemplate the past and the future and to make resolutions. It is very fitting, therefore, to have the first of January the time when for once we do stop a little to see how far we have come and how far we have yet to go and to awaken anew the old desires for accomplishment whose

keenness has been dulled somewhat by the continual friction of our workaday lives.

Of the many things which 1910 introduced or carried along, among the most brilliant and hopeful have been the researches into the nature of poliomyelitis, indicating with probability the character of the exciting organism, establishing its communicability, and giving promise of a method of immunization. Progress has been made also in the treatment of the resultant paralysis and the value of persistence in restoring lost function has been demonstrated by a devoted few. Vaccine treatments have been legion. All bacterial diseases have seemingly been benefited, and although this has to be completely substantiated, we can yet feel that typhoid certainly and scarlatina probably may thus be prevented, while chronic suppurations of bones and joints, chronic otitis media, scarlatinal mastoiditis, colon bacillus infections of the urinary tract, and perhaps gonorrheal vaginitis may thus be cured. Salvarsan has brought the hope that congenital syphilis may yield immediately and its later manifestations disappear. Medical research has received increased appropriations and additional buildings, while medical education has had administered to it the wholesome, if bitter, dose prepared by Mr. Abraham Flexner, of the Carnegie Foundation, whose remarkable report on his investigations of the existing conditions has already produced satisfactory reorganizations and promises to be an efficient guide whereby the seeker after medical knowledge may know before it is too late how utterly unfit may be the school of his first choice and choose more wisely. Above all, the year has been significant because of the general awakening to the value of, and the necessity for all kinds of prevention—of infant mortality, of blindness, of immorality, of tuberculosis and other diseases; for the education of all types and classes of people in the truths of hygiene and medical sociology; and because of the organization of concerted effort along these lines in the various societies and congresses.

So, for the new year stand ready all these things to be car-

ried on and brought nearer to complete fruition. The same old enemies, the same old fight with perhaps better weapons! We have still to furnish to all the little ones strong and pure fathers and mothers; to provide that their birth shall be attended by cleanliness, be it of doctor or of midwife; that no longed-for little life shall be sacrificed, and no eyesight darkened by the lack of forethought or skill; that for the delicate digestion of infancy shall flow its natural heritage, mother's milk, or else clean milk of the cow; that fresh air and sunlight shall permit all to grow healthfully; that no overcrowding shall spread disease, nor insufficient nourishment prepare the ground for its sowing; that all shall be done to prevent and to educate, and, thereby, to rear a better race. No mean task this, confronting our revived energies and our eager determination.

To our readers, then, we wish a very happy and successful New Year. We hope that the solving of some of these problems may be the work of some of you. And in that endeavor the ARCHIVES, now entering its twenty-eighth year of service, hopes, as in the past, to further all that leads to their accomplishment, to ascertain the most advanced thought in all these lines and to present it fully and satisfactorily to you.

CORRECTION.

On page 900 of the December 1910 number of the ARCHIVES, "Huber" in line nine should be "Hoobler."

ORIGINAL COMMUNICATIONS.

MORTALITY DURING THE EARLY WEEKS.

ADDRESS AT THE OPENING SESSION OF THE ASSOCIATION FOR THE
STUDY AND PREVENTION OF INFANT MORTALITY.

Baltimore, November 9, 1910.

BY A. JACOBI, M.D., LL.D.,
New York.

In the official programme of this Association I read as follows: "The definition of stillbirth varies from time to time and from place to place. Infants of days or of weeks may be counted as still births. Frequently no publication is made of the numbers included under the title 'stillbirths.'" Another paragraph says: "Deaths of infants two weeks old or under *may be*, and in some cities are, thrown out of the mortality account."

What I want you to do is to ask any woman who has waited a year, or five years, or ten, for the final consummation of her anxious, loving hope, to what extent she consents to agree with the cruel definition displayed in your programme. Her tears or her trembling lips will tell her tale of woe. The physician, however, and the registrar may give you the approximate number of prematurely cut-off human entities, and estimate the loss experienced by mankind through the death of babies who might have been spared, and might have enjoyed and utilized the existence upon which they had a legitimate claim.

Excesses of infant mortality are not limited to advanced months, in which the proper and wholesome nutriment commands the attention of the physician, the statesman and the philanthropist. On the contrary, the highest infant mortality is observed in the first few weeks of life, when the physical connection of the new creature with its mother has just been severed. Its body, its blood and nerves are mostly the results of inheritance. The future of the body was determined in the womb. It depends on the functional and organic constitution of father and mother. *Their* health furnishes healthy infants; *their* debility or contamination a feeble or contaminated offspring. Inheritance is a powerful factor in the formation and health of the baby. That

its nose or ear, its walk or its stature is inherited is a recognized fact. In the few moments at my disposal I may therefore merely be permitted to conclude that the diseases and frailties of the parents will be reproduced, actually or potentially, in the offspring; not always in the same form, but frequently with such predispositions only as will disturb the equilibrium of the functions of the organs. Parents with hysteria, or epilepsy, or other nervous diseases, with diabetes, alcoholism, criminal instincts or other forms of insanity, insure dispositions to kindred, if not the same, affections.

Syphilis is fatal to the embryo or fetus, dangerous to the baby, who frequently succumbs to its ravages within days or weeks of its life. In spite of the Godsent Paul Ehrlich, who promises to eradicate the disease, generations will still suffer from it, and the baby's health and life will still depend on the complete recovery of both father and mother, and on the appropriate and energetic treatment of the newborn. That is how that baby may be, and is, saved. Tuberculosis in the mother will only predispose the baby; open tuberculosis will directly infect the nursling—it may be the first day or week. Local inflammations of the womb are frequent causes of malformations, aye, amputations, aye, fatal monstrosities in the baby; that is how its health and life depend on the treatment and care of her who is to be, after years, perhaps, a mother. So individual caution of the present generation will, or may, and must, safeguard the existence of the newborn that is to be. In that connection it should be known, however, that consanguineous marriages do not deserve the blame attached to them. Two healthy parents are entitled to, and will have, healthy children; it is only the disease, or vice, or incompetency of one or both that is procreated, or even exaggerated, in the new creation. But individual foresight alone does not suffice. It is the duty and the privilege of the commonwealth to see to it that marriages among the unfit or dangerous are prohibited. The watchfulness of a parent over a child is not more justified than the watchfulness of human society over its members. Marriages are not permitted between the immature even now; they should be prohibited among the advanced tuberculous, the insane, the incurable epileptic, the hopeless criminal. The laws of Colorado, California and Indiana justify, and even enact, the practice of rendering the propagation of the physically and morally unfit a physical impossibility.

Look at the present generation. Women underclad, underfed, overworked, cannot bear infants endowed with an organism fit to stay; factory children with no light, no air, no resistance, grow up, if at all, to ages in which they are permitted to procreate their kind. Their poor kind it is—only poorer. They are themselves wasting, their infants die. A few statistical facts lately collected are as follows:—

In Bremen, Germany, 30 per cent. of the women occupied in wool spinning are consumptive; of cigar workers, 37.5 per cent. Amongst those who are married, beside the time required by confinements, the days of sickness are 70 per cent. larger than those of the unmarried. Girls of sixteen work eleven hours a day, interruptions not being counted. Women with child work to the last day possible, and have beside some domestic work to do; their food is scanty and improper, their bodies overtired and defective. The law orders a recess of six weeks after confinement, but it is rarely obeyed. That is why in Hannover 10 per cent. of all women working in factories have pelvic diseases. In England, of 77 married women employed in lead factories, 15 had no children, 35 had 90 miscarriages; of that number 15 never had a living child; 36 others had 113 living children, 61 of whom died very soon. One woman had 8 miscarriages; of her 4 living children, 3 died soon. The average percentage of stillbirths in Switzerland was 3.91; among factory women, 8.2 per cent.

Women working at home are worse off. Their constant labor at the sewing machine undermines their health; seamstresses develop anemia, tuberculosis and consumption, pelvic irregularities and diseases; cigar makers who work at home—such as they call **home**—reap consumption to the amount of 90 per cent. That kind of work and distress begins when puberty is not, or is barely, reached. Such is the kind of woman who, while living in dwellings without air and light, and full of dirt, bears children that are starved before being born, infected with hereditary diseases, and destined to be born only to perish. And children, frequently not far removed from infancy and fed on coarse material, are forced to work—an impossible task—school or no school, until nine, ten, and eleven o'clock at night. Laws intended to protect them are disobeyed whenever possible—and wondrously possible it is. They are expected to be men and women, and to elevate the citizenship of the future. What they accomplish is to populate

asylums, hospitals, protectories, penitentiaries, or the streets, or the cemeteries.

The number of babies that die in the first week or two is very large. The death rate should be lowered by expert knowledge and stubborn attendance. Forty years ago I sat with a newborn, whose nose was obstructed by adenoids and hypertrophic nasal mucous membrane, for three days and nights—no nurses being accessible in antediluvial times—cauterizing the nares and keeping the mouth open. No undertaker's bill in that case. Congenital debility can mostly be prevented by attending to the parents. The healthy generation of to-day secures a healthier generation to-morrow.

Mismanagement of labor kills many babies. Fractures of the upper arm or clavicle, or thigh, should be avoided. Paralysis of an arm contracted during birth is an affection difficult to heal. Wounds of the scalp, the shoulder, the nates, and other parts of the surfaces may lead to blood poisoning. Many die of them. They should be avoided; they *can* be avoided in goodly numbers. Nor are we at the end of our possibilities. A contracted pelvis that will permit a baby to be born only with wounds and fractures, and interrupted circulation and sepsis, and the almost positive certainty of death within a few days, may be circumvented in future by the Cæsarian section. A few weeks ago I listened to the reports of an obstetrician in country practice who saved practically every one of 11 cases—women and infants—by that operation. It warms your heart to learn things that never were done before and never must be omitted in the near future.

Many babies die of asphyxia, or, what is worse, they contract paralysis, epilepsy, or idiocy for life. A few moments more or less in which the baby does not breathe and cry may determine its future. In hundreds of cases of idiocy in small children I have asked my usual question, and received the corresponding answer, that the doctor or midwife was absent, or they had to work over the baby before he cried, with the result of convulsions, or stiffness, or sickly smiles after months only. Sure they would better be dead. But asphyxia has no right to exist, either to kill or to maim.

The blood vessels of the baby are very fragile; hemorrhages, large and small, are frequent. Pressure on the head, on and within which the vessels run in very superficial grooves, causes blood to burst through under the scalp with no—or very little—danger

to the baby; or in the cavity of the skull, with great danger to health or life. In most cases they are the result of protracted labor. That can be avoided.

Many newly-born have died from so-called melena—large amounts of blood being vomited or passed. They were often considered unavoidably fatal, and the babies did die, almost every one of them. Some depended on ulcerations in the infant stomach, caused by the curdling of blood in the smallest blood vessels under the influence of a diseased heart. Many cases are caused or sustained by the lack of coagulation of the infant blood. Within a year Dr. J. E. Welch, of New York, has taught us how to save many by the injection of blood serum taken from some adult, thereby adding to the defective infant blood a ferment which renders it more coagulable. There is new knowledge which is new power. A number of such newborn babies have been saved from certain death this very year; almost all such cases will be saved in future.

Many a cause of death may be avoided. Cold bathing, which prevents or defers reaction; hot bathing, which scalds the skin; improper washing and rubbing of the baby's mouth, during which the mucous membrane is corroded; wanton squeezing of the baby's breasts will give rise to microbic infection and cause sepsis—either in the shape of erysipelas or general blood poisoning—just as the contact of a baby's eye with a certain infected pus may produce blindness or prove fatal. Know the vicious mistakes, and avoid them, and the babies will live and your infant mortality diminish.

Mortality is also increased by the belief prevalent amongst all to whom it should not concern, that it is natural and even wholesome for the newborn to lose weight. What you may admit is that a loss of 5 or 7 ounces of weight during a few days may be balanced on and after the third or fourth day. It has been stated, however, that if the tenth day restores the weight to the original all is well. All is not well. Urination, perspiration—insensible or not—and respiration will abstract water, with and without salts, from the circulation and desiccate the tissues. Ignorant treatment with honey, castor-oil or rhubarb adds to the danger. The loss begins on the first day. Some food and plenty of fluid should be introduced. Some prominent German children's doctors—I might use the name specialist if I could convince myself that specialist sounds, or is, better than doctor—

Czerny and Keller—advise to treat the baby on tea and saccharin. Why tea and saccharin? Water is better. Better for other reasons also: The kidneys of the newborn have small impervious capillaries, but large arteries. That predisposes to insufficient circulation in the soft embryonal organ. Asphyxia or congenital heart diseases add to it. Now inflammation—Bright's disease—is quite frequent in the newly-born or quite young. On and after the second day of life—for a week or more—the urine often exhibits yellow sand, consisting of uric acid. Water is required in plenty to wash it out. If any of that sand remains, stones will form—indeed, kidney stones in the very young are not at all infrequent—or the kidney tissue is irritated so that blood may be admixed to the urine. Not to give sterile water frequently to the newly-born provokes illness and possibly death. Now as you are bent upon removing infant mortality you may possibly heed me. To me and to many babies the knowledge of the need of water has been a source of gratification since Virchow published his paper on “Uric Acid Infarction,” nearly sixty years ago. Diseases of the kidney, moreover, cause intestinal diseases; while, on the other hand, intestinal disorders, mainly in the very young, cause disorders of the kidneys.

Now, ladies and gentlemen, whatever is presented to this Association for the study and prevention of infant mortality should be useful. Our father, Benjamin Franklin, claimed that no philosophy was justified unless it served some purpose. I want, you want, none of the numerous newborn babies to be lost that can be saved. And many, most of them, can be saved. To give up a newborn merely because it seems to be feeble and unpromising is preposterous. Kant, Goethe, Helmholtz are reported to have been puny waifs, whose lives were despaired of. Being saved, they added untold treasures to the intellectual capital of the human race. The opportunities to save the newborn, however, seem to be few, or, rather, have been few only, mainly among the poor. Thus stillbirths were reported in all Switzerland to the number of 3 per cent.; among Swiss working factory women, however, nearly 8 per cent.—a dead loss in babies of 5 per cent., provided even the 3 per cent. were unavoidable. I am afraid, or, rather, hopeful, that many were not.

You will admit that superior knowledge and skill and conscientiousness may save the unborn as they do the aged. Now, I am quite sure that our young doctors, unless they have had the

great luck of being taught in obstetrical wards and practice, learn, if at all, at the expense of the women who bear children and of the infants that are borne by them. And I fear lest many of us, no longer excessively young, remain always just so young. They may be sure I mean no harm, either to them or to myself, for I am willing to admit that I also, at what is sometimes called old age, may have preserved or accumulated an unenviable amount of ignorance, to be remedied by my betters or my successors. So I want to offend nobody; but what I want more is that the babies live, and the country thrive through the babies. Our medical schools do not begin to convey adequate obstetrical knowledge and practice to the students. The frivolous remark that doctors want each a cemetery for themselves is not a source of smile or laughter only. Will the time ever arise when practical wisdom that is to save women and children will be attained without cold corpses and hot tears?

Affluence and care and caution, and the services of a medical man and a nurse—the latter with or without an ornamental knowledge of Latin or Greek—surround the bed on which a newly-born cry is first received. The number of those, however, who cannot enjoy such privileges is growing from year to year. The poor go without the safety vouchsafed by knowledge and by means. Their women *suffer* for want of help; the babies *die* without it. In New York 200 women are reported to have died of puerperal fever in one year. Their babies rarely survive when the mothers die. That makes 400. Two hundred cases, however, are not the exact number. I know that this very day, as ever before, the diagnosis of acute Bright's disease, of peritonitis, of pneumonia is inscribed on the certificates received by the Health Departments, where it should be puerperal fever. And puerperal fever *is* avoidable; its occurrence is a scandal and a shame in the community—like smallpox or typhoid fever—and no actual precaution is taken to avoid it. Poor agricultural Prussia had its well-informed and trained and supervised and responsible midwives a century ago. There was and is no village in that country without one. We, however, have none that can compare with them. We cling to our prejudices and our indolence. Forty years ago the midwife question was discussed in a large New York Medical Society. One per cent. of the members present voted for instructing and licensing and supervising midwives. And this very day the system

under which they practice is slovenly and shiftless; no instruction is held out, no examination enforced, and the babies swell—what you are bound to combat—infant mortality of all classes. You do not question where the baby was born—it is a human baby; you do not consider the usefulness or uselessness of a baby after it will have grown up. We never question the rights of an individual, though one may be the offspring of the poor, who will struggle and work and add to the wealth of the Nation; and the other, that of the idle rich that never will learn to work and create, but only to consume. In the roll of humanity, the latter is the inferior creature; but before our forum here, and statistically, they are equal. Still, I plead for the millions of the babies of the poor, who are excluded from the benefits of scientific hygiene.

The women of the Nation must be healthy, else the young will be feeble and sickly. But the vast majority of the confined women in the large cities have no time to recover. Under the law in Prussia, workingwomen are not readmitted to factories within six weeks after their confinement. Then they may allow their forsaken babies to shift for themselves. Those who do not work in factories work at home, there and here. Tens of thousands get up after their confinement on the third or fourth day to do the washing and the rest. Instead of the two months, which is the shortest period in which the organs can become again normal, a few days are allowed, with scanty food and no attention, and a household to care for. A woman that has not sufficient time to recover will start and retain her pelvic inflammation and decrepitude. Her present child suffers and dwindles and dies; the future ones, if any there be, will be decrepit when born, and are counted, or will be counted, among the stillborn.

In New York City there are at best 1,000 beds for convalescents of all classes; \$5,000,000 destined for convalescent homes by an old man who died lately are contested for the moral reason that they are \$5,000,000. The only Mr. Schrader, of Westchester County, N. Y., has proven by the foundations of his Catherine Rest that puerperal women can be nursed to *complete* health, and their babies preserved like *your* healthy babies. Let there be a thousand Schraders, and the generation of women with lifelong invalidism will soon be extinct, and the babies will no longer swell the ranks of infant mortality. Why do I speak of women and of infants at the same time? Unfortunately, they cannot be separated. They suffer together. The sobs of an invalid woman

and the moans of a condemned baby are not heard along the shrieks of a furnace or locomotive.

What did I wish to say? Something very prosaic, viz.: If you want to break up the infant mortality of the first weeks of life, see that your young doctors can be made competent and the indigent women supplied with a thoroughly informed midwife. As long as you cannot abolish dire poverty, give no rest to your legislatures, none to your health departments. No infant fit to live must be sacrificed through the absence of a competent and responsible midwife, who is taught enough of hygiene to prevent fatal mistakes, and enough to know when it is time to send for a doctor.

ANOMALOUS SCARLET FEVER.—Harold Newton Cole (*Journal of the American Medical Association*, July 16, 1910) reports three epidemics, in all 32 cases, of what he supposes is anomalous scarlet fever, which occurred at the Lakeside Hospital, in Cleveland. In each of these epidemics the disease might have passed unrecognized had not one or more typical cases occurred which acted as a diagnostic control. These epidemics were characterized by the mildness of the attack and the benign course of the disease, together with suppression or complete absence of the exanthem, as well as of some other of the important symptoms. The temperature in these cases varied from normal to 105°F, but in general it ranged from 100° to 102° F. In only 2 cases was there absence of all the signs of nephritis. Practically every case had severe angina. The changes noted in the blood were a marked increase in the number of leukocytes in a few cases, and in a number of instances the differential blood count showed a high percentage of eosinophiles. From these epidemics, as well as others cited, it appears that the toxin varies in different outbreaks. It does not appear that mild infections beget malignant strains, or the reverse. From the fact that the tonsils are involved at a very early stage, and from the constancy with which this symptom has been noted, it would seem that the infecting agent gains access through these glands, as claimed by Dawson and Lemoine. It seems unwise with our imperfect knowledge concerning the etiology of scarlet fever to regard these aberrant forms, which point strongly to some aberration of the exciting cause, as distinct affections.—*Medical Record*.

SHOULD ECLAMPTIC MOTHERS NURSE THEIR NEWBORN?

BY JAMES R. GOODALL, B.A., M.D., C.M.,

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Within the last few years several pathetic cases have come under my notice, the sincere consideration of which has led me to endeavor to find a satisfactory answer to the title of this paper, "Should Eclamptic Mothers Nurse Their Newborn?"

The question considered from the point of view of the interests of the child is a new one—one upon which nothing has been written and upon which little, if any, discussion at all has taken place.

My cases are 3 in number, where healthy infants, or seemingly healthy infants, evinced no signs whatsoever of disease until the first copious nursing, when they suddenly died without apparent cause. These children died a death so similar in its antecedents that we are compelled to think that their exitus was from a common cause. They were well, even in vigorous health, until two hours after a copious nursing, and they were so insidiously and rapidly taken ill that it was easy to see that there was no chance of recovery, even though seen in the early stage of the onset.

Let me describe the cases in full and later consider some of the broader questions dealing with the effects of eclampsia upon both the mother and her offspring. I am writing of these cases not in the spirit of the man, who feels that when he has completed his report the last word will have been said upon so weighty a matter, but rather in the spirit of the man who seeks after knowledge with an open mind, hoping that his lines may draw forth evidence from other sources, either to corroborate or refute his conclusions.

The first case was a near relative, a young woman of thirty-five years, mother of three children, and a more healthy specimen of womanhood one seldom sees. She was delivered at full term of a strong, healthy infant, which cried lustily immediately after birth. According to the physician's statement—and this is fully corroborated by statements of near relatives—the patient had

shown no signs of eclampsia either before or after delivery. The labor was easy and free from instrumentation. I happened to be on a visit to Ottawa at the time and called to see her on the second day after delivery. She looked remarkably well and seemed in the best of spirits, except for a slight headache. The child was a strong, vigorous, well-nourished baby of 8½ pounds. To my very great surprise I was summoned to Ottawa on the following morning to find the mother in the coma of eclampsia. She had gone to sleep at ten o'clock on the previous evening and the nurse slept on a lounge in the same room. At seven o'clock the nurse was awakened by the bumping of the head of the bed against the wall. Her patient was in a convulsive seizure. Convulsion followed upon convulsion in rapidly decreasing intervals. I arrived in Ottawa on the noon train to find the patient in a deep coma, from which she died without rallying, except for a few moments, when she made sign for writing materials to let her husband know her wishes which she could not speak. She gradually sank and died that night at eight o'clock from respiratory failure during a seizure.

The child had nursed for the last time at five o'clock that morning. During the night the breasts had filled up rapidly and it was the first successful nursing that the child had had.

At ten o'clock the nurse looked at the child to find it blue in the finger tips and nails and cold about the ears and feet. Previous to this, owing to excitement over the mother's condition, the child had been overlooked. At noon, upon my arrival, the child was cold and cyanosed about the extremities, and respirations were irregular and shallow. Somnolence was very pronounced and seemed to amount almost to coma. The pulse was slow and full. The abdomen was slightly distended. There were slight muscular twitchings of the face and rigidity of the extremities. At four o'clock the abdomen became markedly distended and tense like a drum membrane. The cyanosis had spread to involve the cheeks and neck, the eyes were closed and the lips a dark livid color. Respirations were very slow and very shallow, though very variable, like a Cheyne-Stokes respiration. Careful examination now and previously did not help to clear up the diagnosis. The respirations grew more shallow and slower, the cyanosis gradually spread and deepened, and the abdomen became still more distended, in spite of all measures adopted. At six o'clock respirations gradually ceased and the cyanosis became intense;

slight convulsive seizures had preceded the cessation of respiration. Upon my being summoned I found the heart still vigorously beating and, by means of artificial respiration, the cyanosis was gradually relieved but respirations could not be established. After fully twenty minutes of artificial breathing the pulse could still be detected in the radials.

The second case is very similar in the main, though differing somewhat in several particulars.

CASE II. is that of a young woman of twenty-eight years. She had had albuminuria and casts during the last month of her pregnancy, and in the last week antepartum had suffered a very great deal from occipital headache and epigastric pain. Her labor was easy and not very long. The above symptoms continued for the first day after labor and thirty-two hours after delivery she had her first convulsive seizure. Three convulsions followed in as many half hours and then she slowly recovered. The child had been nursing previous to the seizures and nursing was continued afterward. It received no satisfaction at the breasts until the morning of the third day, when it had a full nursing and ceased to cry. Six hours later its hands and feet were cyanosed and cold and its lips were blue. Respirations were shallow and slow. The child was somnolent and there were muscular twitchings with occasional nystagmus. Careful examination failed to reveal anything in the several systems. The respirations grew shallower and slower until they finally ceased and the cyanosis grew progressively deeper. Distention was well marked, in fact, both cases were so similar in every respect that I was at once roused to find a common cause.

CASE III. is of more recent date. Mrs. S., a strong, healthy woman, in her third pregnancy, suffered from albuminuria during the last two months of her pregnant state. She was in the seventh month when I first saw her. My examination at that time revealed a markedly accentuated aortic second sound and a marked hydramnios. I at once suspected renal insufficiency, and upon analysis found 4 grams of albumin to the liter. On a strictly milk diet she improved a great deal, both as to her hydramnios and as to her great discomfort when lying down, owing to dyspnea. The albumin fell somewhat in amount but the quantity of urine, though of low specific gravity, was always large. However, the improvement was only temporary, for soon the albumin rose from 3 grams to 7.5 and later to 10 grams.

Singularly enough, the symptoms apart from those caused by the hydramnios were almost negligible. There was a very slight edema of the ankles and in the region of the hypogastrium, as is so frequently found in hydramnios. She never had headache or vomiting.

Labor came on on December 26th, ten days before the calculated time. The membranes ruptured almost with the first pains, but the labor progressed rapidly and easily. During the second stage the patient's eyelids twitched, the right side of the face had slight convulsive attacks and twice, when the pains were on, the eyes turned to the left and became fixed and respiration became somewhat jerky. However, though sailing close to the wind, she escaped without accident.

On the second day the mother complained of loss of appetite and severe headache. The bowels had moved and moved freely. But the urine was still loaded with casts, albumin and bile, and there was edema of the eyelids. There was slight jaundice. On the morning of the third day the patient seemed a great deal better, and as I entered the room, she said that the baby had been ravenous previously, but that she had felt the milk pouring into her breasts during the night and it had had a good nursing in the morning at seven and not a whimper had been heard from it since, but it would not nurse the second time, it seemed so drowsy. She asked me to have a look at it to see that it was all right. As I passed out of the room the nurse said, "I think the baby is sick." A glance was sufficient. The same clinical picture was before me: duski-ness, cold extremities, blue nose, shallow, irregular respirations and muscular rigidity from time to time in the lower extremities. A careful examination threw no light upon the diagnosis. At six o'clock that night I was told to come at once. The father met me in the hall and said that "it was all over with the baby." The child had been dead some minutes, judging from what was told me. It had been laid out in a child's cot in the nursery and was covered with a white sheet. All this had been done deliberately after the supposed death. When I raised the sheet, the face and neck were almost as black as ink, but the pulse was still readily palpable at the wrist. I am not prepared to say how much time had elapsed between the "death" of the child and my arrival, but I simply cite the facts and leave my readers to judge for themselves. I took the child to the grate fire and began artificial respiration so that the cyanosis diminished rapidly. I continued the

manœuvre for about fifteen minutes, and at that time, though the radial pulse was not palpable, the cardiac sounds were audible with the stethoscope. The child died after one-half hour's fruitless effort.

The albumin persisted for a long time in large quantities in the mother's urine and was not entirely normal until six months after delivery.

Such are the histories of my cases. The casual reading, not to say the careful study of them, will, I think, leave every thinking practitioner with the question in his mind, Was there any connection between the nursing and the incidence of the sudden change in the child's health? What was the nature of this illness? Is an eclamptic mother's milk toxic? If toxic, why to her own child, which was nourished from her own blood? Were these children healthy or only seemingly healthy before the onset of such startling symptoms? Are children born of eclamptics healthy children? Can mother's milk secrete a condensed or accumulative toxin more virulent than that which she has circulating in her blood? In a word, should eclamptic mothers nurse their newborn babies?

I have made a complete review of the literature in the hope of finding analogous cases, but as fruit of my labor I found but one well-authenticated case. But the search has been replete with interest and has thrown a great deal of light upon these rather obscure questions.

Let me begin by answering the question,

*Are Children Born of Eclamptic Mothers Healthy at the
Time of Their Birth?*

A great deal of literature upon the subject proves conclusively that they are far from being healthy. Von Winckel, in 1893, was the first to lay stress upon the necessity of performing autopsies upon children born of eclamptic mothers. Since then many authors have given their attention to this side of eclampsia with results that have been far reaching. Bar and Guyiesse found that in seventeen children born of eclamptic mothers in all cases there were signs of general intoxication and in a large percentage the lesions were identical with those of eclamptic mothers who had succumbed to the disease.

Schmorl autopsied 6 children born of eclamptic mothers, and

in 4 cases found advanced degeneration of the kidneys and hemorrhages in the liver in all 6 of them. Lubarsch examined 5 such children and found advanced renal and hepatic lesions in all of them. Prutz found in the kidneys of a child of an eclamptic cellular degeneration of the renal tubules with cellular and hyalin casts in their lumen. Similar results are recorded by Chamberlent, Knapp, Dienst and Williams.

Moreover, there are on record not a few cases where the infant born of an eclamptic mother or of a mother who presented all the primordial signs of eclampsia, developed true eclamptic seizures within the first three days after birth. Some of these succumbed, others survived. Schmid published one such case in which convulsions occurred shortly after birth. The autopsy showed all the organs to be affected similarly to those of eclamptic women. The kidneys were particularly affected, showing marked degeneration and associated with albuminuria and hematuria. Wilke wrote of a case in which typical eclamptic seizures came on after birth and the autopsy revealed a toxic encephalitis. Similar cases have been described by Moraweck, Wendt, Woyer, Nicarelli, Pels-Leusden and Winkler.

Knapp held an autopsy on mother and child and found the same pathologic changes in both.

It is also interesting to note that Schmid found albuminuria in the case of a child which died of eclampsia. This was corroborated by Eskelin, who found blood and casts and albumin five times in as many cases born of eclamptic mothers. Similar results have been described by Audebert and Arnozan.

Dienst's exhaustive monograph deals with 7 cases of eclampsia or threatened eclampsia in the mother, and with either signs of advanced nephritis or with true eclamptic seizures in their offspring. His first case was twenty-two years of age. She had one eclamptic seizure immediately after delivery and then made an uninterrupted recovery. The child had its first convulsion seven minutes after birth. Others succeeded rapidly, and it died of respiratory failure. The breathing grew slow, irregular and very shallow and cyanosis was well marked. Deep somnolence was a feature. The heart's action was still strong after the respiration had ceased and artificial respiration was kept up for quite a while. Autopsy showed signs of acute nephritis and the condition of the liver was typical of eclampsia, viz.: focal necrosis, thrombosis, with congestion and hemorrhages.

In the second case mother and child succumbed after Cæsarean section. The child was living when operation was begun but when removed was perfectly rigid in all its body and extremities. It evidently had died in a convulsive seizure in utero. The pathologic findings were similar in both mother and child. The urine was drawn from the child's bladder by means of a soft catheter, immediately after it was delivered from the uterus, and it was found to be the urine of acute nephritis. It contained 10 grams of albumin to the liter, numerous red blood cells, few leukocytes and casts of all kinds.

CASE III. Eclamptic mother died after Cæsarean section. Her child survived. The urine collected from the infant showed hematuria and albumin for three days. The albumin disappeared on the fifth day and the child gained slowly.

CASE IV. Eclamptic mother died, survived by her infant. The urine collected from the child showed a large amount of blood, albumin and leukocytes, hyalin and blood casts. The urine was free from albumin for the first time on the eighteenth day after birth.

CASE V. The mother died in eclamptic seizure. Her child had light convulsive seizures during the first five hours after delivery.

CASE VI. Eclamptic mother gave birth to twins. The mother had but one convulsion and recovered. The twins thrived, though both gave urine loaded with blood, albumin and casts.

CASE VII. was of less importance.

Wilke published a case also where the infant had its fourth convulsive seizure twelve and one-half hours after delivery and its mother her first eclamptic convulsion thirteen hours postpartum. In Woyer's case the mother had her first eclamptic seizure four hours antepartum and three more postpartum. The child died after its fourth convulsion.

Similar cases are reported by Schmid, Moraweck, Gurick, Eskelin and Levinowitsch. In one of Gurick's cases the eclamptic convulsion did not appear in the child until forty-six hours after birth.

I think that enough has been quoted to show that children born of eclamptic mothers are far from being healthy. In every one of them marked structural changes in the viscera, indicative of grave intoxication, were readily demonstrated. Practically all of them, both those which survived and those which died, in whom the

urine had been examined, showed all the signs of more or less renal injury. The milder cases showed only slight albuminuria and casts, the graver cases showed blood, albumin and casts in large quantities. Moreover, in one case, the albuminuria persisted for eighteen days after birth. In all the cases that succumbed there were grave structural changes in the liver and other viscera. Hence, it may be affirmed with all certitude that the vast majority of children born of eclamptic mothers, or of mothers threatened with eclampsia, are more or less profoundly and similarly affected. Inasmuch as 2 of my cases were eclamptic mothers and the third had 10 grams of albumin to the liter and had muscular twitchings during delivery, one is pretty safe in considering the children as being tainted with the same disease as the mother.

I think, therefore, the answers to the questions, Are Children Born of Eclamptic Mothers Healthy? Were the children in my 3 cases healthy or only seemingly healthy before the onset of such startling symptoms? can be considered as settled as can any question in the open subject of medicine.

Moreover, I consider eclampsia in the mother a fruitful source of the many chronic cases of nephritis in young children. How often nephritis occurs in children from three to six months of age is rather difficult to establish. But this I do know that, within the last four months, my attention has been called to 2 such cases by practitioners, who knew that I was interested in the subject. The frequency of nephritis is overlooked in a great many cases, owing to difficulty of getting specimens of urine. But Dr. F. M. Fry, who has made urinalyses in 100 cases of infants in the founding hospitals, has devised an easy method of obtaining specimens. This consists in putting cold to the abdomen or buttocks. It seldom fails and a specimen can be obtained at any time, provided two hours have elapsed since the last urination. He found nephritis, evidenced by casts, in 31 per cent., and evidenced by albumin and casts in 19 per cent. Yet it seems strange that in looking over standard works upon diseases of infants, not one author makes mention of eclampsia, which, to me, seems such a potent factor in the etiology of nephritis in children.

Since writing these foregoing lines another case of death of a child with all the symptoms of nephritis has come to my notice. It was in its fifth month and was born of an eclamptic.

Is an Eclamptic Mother's Milk Toxic?

It would be a very singular lack of coincidence if a mother's blood could be saturated with the poisons of metabolism to such a degree as to cause the grave cerebral disturbances culminating in eclamptic seizures, without the secretion of the breasts being at all tainted with the same metabolic products. It would be contrary to all the laws which govern secretions. Some of the toxins must pass over into the milk. As evidence of this I have but to mention the startling symptoms in the infant when small doses of drugs are administered by mouth to the mother. In such cases the doses given have been infinitesimal, yet the poisonous action has been seen in the nursing infant. At least we must assume that a certain quantity of the toxins are eliminated in the milk. So much the more must this be the case, for Massen has shown that the urine of eclamptic mothers is less toxic than is their blood. Owing to the failure of the diseased kidneys to eliminate the products of metabolism, the poisons become stored up in the blood. Under such circumstances can the reader adduce any one case where the loss of function in one eliminative organ has not been more or less compensated for by other organs of elimination? And as to the question of the secretion of toxins in the milk, can we doubt the fact when we know that even bacteria pass from the mother's blood-stream into the breast secretion? I think it is thoroughly established at the present day. The whole clinical picture is one of metabolic arrangement whereby the organism becomes saturated with the products of an autointoxication. That poisons do pass over in the milk needs, I think, no further evidence of confirmation.

If a mother's milk is toxic, why should it be to her infant, which has been nourished through her own blood? Can a mother's milk secrete a concentrated, an accumulative toxin more virulent than that which circulates in her system?

Let me begin by answering the second question first. We have no evidence which we can bring to bear upon this question; I mean purely experimental evidence. The clinical evidence is slight but of great value. But by analogy we have the strongest proof that such can be and is the case, that the mother's milk can secrete a more concentrated toxin than that which circulates in her blood. For example, take mercury; its administration to a nursing mother has produced on more than one occasion alarming symptoms of

poisoning in her child. Again, let me but refer to an experience of my own in which, owing to gall-stone attacks, I had administered two $\frac{1}{4}$ grain doses of morphia within twenty minutes, yet the fetus in utero, so far as auscultation was concerned, showed no untoward effect, but the administration of $\frac{1}{4}$ grain six days later and four and one-half days after the delivery of the child caused the most alarming symptoms in the nursing infant. In other words, it got a more concentrated or larger dose through the milk than through the mother's placental circulation. You will probably object that morphia is a respiratory depressant and that the respiratory center is inactive in utero. To this objection let me state that the eclamptic toxin acts also as a strong respiratory depressant in the fetus and its action is very similar to that of morphia, so the objection becomes on the contrary a very strengthening argument.

To further substantiate this point I am indebted to my colleague, Dr. J. C. Meakins, for a most interesting case report. While working in the Rockefeller Institute as clinical analyst, he had occasion to enquire into the cause of a persistent diarrhea in a nursing child. He found that the mother had been taking five minims of Fowler's solution after meals. The diarrhea in the infant had resisted all remedial measures. He found upon examination of the mother's milk and urine that the same quantity of arsenic could be obtained from one part of milk as from ten parts of urine. In other words, the arsenic in the milk was ten times stronger than that in the urine. As soon as the arsenic treatment was stopped the child grew better of its diarrhea. The same argument holds for the toxin of eclamptics, for their urine is far less toxic than is their blood, and the breasts, having been free from function prior to delivery, would not be diseased to the same degree as the kidneys, and nature would in all likelihood use them as a new avenue for elimination of toxic products.

Now let us turn our attention to the first question. If a mother's milk is toxic, why should it be toxic to her infant, which has been nourished through her own circulation? This is probably the most interesting point of this paper. It would seem very strange if a mother's milk is toxic why so few infants are overcome. The reason for this seeming discrepancy is not far to find. It is known that in most cases of eclampsia, yes, in the vast majority of cases, the convulsive seizures come on prior to delivery and that with the emptying of the uterus the patient's condition rapidly

improves. So rapid is the improvement that the albumin in a large percentage of cases has completely disappeared by the third day. One has but to think of the tremendous diuresis which inaugurates the general improvement, to realize what an astounding amount of toxin must be eliminated in the first days postpartum. Such is the course of the usual case. Yet it is just during this period that the breasts are almost, if not wholly, inactive, and by the time the breasts begin to secrete there is no longer any or but a comparatively low grade of toxemia present in the mother. No, it is not in such cases that the milk becomes very toxic, it is just in those cases where the toxemia of the mother remains, owing to failure of elimination, or, worse still, when it reaches its height during full lactation. It will be in those cases in which some grave antecedent chronic renal affection prevents rapid elimination and favors a prolonged high index of maternal toxicity, or it will be in those cases where the seizures come on late postpartum. It may be stated that the later the convulsions postpartum, and therefore the nearer to the period of full lactation, the graver will be the prognosis for the nursing child. Does this conform with my experience? It does exactly. Let me cite my cases.

CASE I. Seizures began on the morning of the third day. The baby had had its first copious nursing two hours before the onset of the convulsions.

CASE II. Eclampsia set in thirty-two hours postpartum. The infant received satisfaction at the breast for the first time a few hours previously.

CASE III. Muscular twitchings at labor, but no convulsions. Severe headache and loss of appetite on second day. The urine remained full of albumin, 7 grams to the liter, and contained numerous casts. The child took sick on the morning of the third day, after the mother had felt the milk pouring into the breasts through the previous night. The albumin did not disappear from the urine until six months postpartum in this last case.

One well-authenticated case in the literature is that of Kruetzman, Assistant Physician to the Chair of Obstetrics and Gynecology at the University of Erlangen (Professor Zweifel), from whose report I will quote freely, inasmuch as it bears out to a nicety my own previously formed conclusions.

Patient was a perfectly healthy primipara who showed signs of albuminuria at the sixth month of her pregnancy. During the last month the albumin was 6 grams to the liter. The labor was easy

and the child vigorous. There were no eclamptic seizures in the mother's case. The mother's recovery was good, though the albumin persisted for a long time. "The baby cried immediately and was perfectly normal. It weighed nearly eight pounds. He slept all day and acted in every way as any other healthy baby would do. The mother wished to nurse the baby, so he was put to the breast, not getting anything there certainly but some colostrum; the nurse gave him a little boiled water to drink. On the second night, about thirty-six hours after birth, the baby was taken with convulsions, which came on without any warning; another attack was noticed next morning and a third one at 8 A.M. Neither one of these I myself had the opportunity to see. At 11 A.M. there occurred another one, followed in half an hour by a fifth. This last one occurred while I was in the room. . . . He was kept perfectly quiet, not handled at all; bromide of potash was given. There occurred only one more short attack in the evening; from that time on the baby thrived on diluted cow's milk and later on a wet nurse's breast beautifully. From the time of the first convulsion he had not been put to the breasts. . . . The convulsions were described by the nurse as being identical with those I saw."

After eliminating all possibility he concludes that the cause must lie in the transmission of the toxins of the mother to her child in utero and that this later caused the convulsions, or, "there is still another possibility of intoxication for our newborn; it had been put to the breast repeatedly and certainly some colostrum was sucked and absorbed. This colostrum may have been the vehicle through which the toxic matter was carried into the newborn's organism. Mentioning these possibilities I am fully aware that I move on the unsafe ground of theoretical speculation. But the case remains decidedly interesting; the mother, suffering from a severe nephritis of pregnancy, goes through parturition without eclampsia: the newborn, to all appearances normal and healthy, is taken with general convulsions resembling those of eclampsia parturientum."

In the review of this article for the *Zentralblatt für Gynäkologie*, the writer concludes his résumé in the following line: "Surely this case is not without the greatest interest to the followers of the theory of the toxemia of eclampsia."

Kreutzman in reviewing the possibilities for such an eclamptic accident states that it may be due to toxic influence during life in utero, or to the passage of toxins from mother to child through

the breasts. Why separate the two at all? It has been proven beyond the shadow of a doubt that children of eclamptics or nephritics are children with a vitality below par. They come into the world diseased as to their several organs, and diseased especially as to their kidneys. That means clinically lowered power of assimilation; but it means more, it means diminished power of elimination through diseased kidneys. Hence in the diseased state of fetal toxemia the poisons in the colostrum are but "the last straw." To many, as we have seen, this "last straw" was unnecessary, for the children passed into the eclamptic state before they nursed at all. And just as not all children have suffered equally before birth, so will they not all suffer alike from toxic nursing. The degree of disease in the newborn will be in direct proportion to the length of time which it has been subjected to the poison in utero. But it will depend also upon one other factor, viz.: how long it will have been in utero after the mother's true eclampsia has set in.

Too much stress cannot be laid upon these two last factors, yet of the two the second is the more important. Seldom it is that children of eclamptic mothers die in utero before the maternal eclamptic convulsions set in, but they usually succumb during or shortly after a seizure. The immediate cause for the onset of the convulsions in the mother is found in the uterine contraction, just as the cause of death of the fetus may be laid to the same score.

When studying in the Obstetrical Schools of Paris I was taught—and I am a firm believer in the teaching—that eclamptic attacks seldom, if ever, come on in pregnant women without uterine contractions having set in. They found the immediate cause in uterine contraction, inasmuch as this pumping action of the uterine muscles throws a large amount of toxins into the general systemic circulation. We have every reason to believe that the cause of eclampsia is the pregnancy and the cause of pregnancy is the fetus with its appendages. Removal of these, or even death of these, generally brings about a cure. The toxin therefore is generally thought to be of fetal origin. Therefore compression of the large uterine lymphatics and cavernous sinuses, as well as compression of the whole of the uterine contents, throws a larger amount of toxins into the maternal circulation than the maternal tissues are wont to receive in a given time. The result is a flooding of the maternal organism with the noxious products and this finds its expression in an eclamptic convulsion.

Prior to the onset of the attack the woman may not have been conscious of any uterine pain. This is not a strong argument against the presence of uterine action, for pains frequently go on for a long time without causing any marked impression upon the consciousness, and especially is this aided by the mental torpidity more or less profound which so frequently precedes an eclamptic attack. Moreover, how often is this the case, that you are called to an eclamptic who has had one seizure; she is still conscious; has no knowledge of labor having set in, yet when you examine you are able to say that labor certainly has started. Dilatation is advanced sufficiently to let you know at once that labor is on. This is the rule and not the exception. On the other hand, the teaching in most of our schools is that the convulsion starts the labor.

What is the effect upon the fetus? Why may it remain in utero for weeks before the eclamptic seizure and suffer pathologic change in all its organs, yet so seldom succumb, whereas with one eclamptic seizure it may die in utero, or if it does not die will suffer more and more with each maternal spasm? The causes of death are two in number. Most seem to die of asphyxia due to the prolonged spasm of the maternal respiratory muscles together with the prolonged uterine spasms. But not a few die before birth as a result of eclamptic seizures. As proof of this 3 cases are on record (Dohrn, Dienst, Ebinger) in which during Cæsarean section perfectly rigid dead children were removed, whereas the offspring were living at the time of the beginning of the Cæsarean operation. These children passed at once seemingly from a state of eclamptic tonus into the rigidity of death.

In what do my 3 cases resemble that of Kreutzman and of others? In all of them the clinical picture was the same except for one fact, namely, that in my cases there was not a true eclamptic seizure in any of the children, but there were rigidity of the muscles and muscular twitchings. In other respects there was always the somnolent state, the cyanosis, the irregular—now slow, now rapid—shallow breathing, gradually growing slower and finally ceasing; strong cardiac action long after cessation of breathing; prolongation of life for a considerable time by artificial respirations; absence of nausea and vomiting, or of signs of disease in any of the systems. The symptom complex of the disease set in in apparently healthy children without other cause than nursing. Such was exactly the cause also in Kreutzman's report.

Granted then that these 3 cases succumbed to, and Kreutzman's case was seized with convulsions from, the milk of toxic mothers, can a means of preventing such untoward effects be suggested? A consideration of the foregoing cases allows of an easy solution.

1. In a mother profoundly toxemic and jaundiced, I think it will be well to feed artificially for quite a few days, and have the breasts pumped dry once or twice after the maternal toxemia has improved and before the child is allowed to nurse.

2. If the maternal convulsions come on postpartum (these are the most dangerous cases for the nursing infant), then allow the maternal elimination to go on until she is freed from the greater part of her toxemia and then empty the breasts before allowing the child to nurse.

3. If the albuminuria persists after gestation, it will be well to feed artificially throughout.

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THE DIAGNOSIS OF PLEURITIC EFFUSIONS IN INFANCY.*

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Inasmuch as the great majority of pleural effusions encountered in infancy are purulent in character, this is, to speak strictly, a paper on the diagnosis of empyema. The well-known purulent nature of practically all effusions in infancy is corroborated by the records of the Children's Hospital of Philadelphia, where, among 54 consecutive cases of pleural effusion in children under two years of age, 51, or 94 per cent., were purulent, and but 3 serofibrinous. In view of the disastrous and often fatal results consequent upon failure to recognize empyema in infancy, an early and correct diagnosis is of extreme importance; indeed, it cannot be overestimated. Too strong emphasis cannot be placed upon the fact that under six months of age empyema is a very fatal disease, death having occurred within two days of the onset, as in a case of Goodhart and Still's. It is no credit to the physician, and is fraught with peril to the patient, to make a diagnosis when the chest is full of pus, since successful and proper treatment (*i.e.*, surgical treatment) depends upon prompt and early recognition of the disease.

Henoch, in his classical "lectures," referring to latent empyema, remarks that the latency exists more in the carelessness or ignorance of the physician than in the peculiar nature of the affection. This criticism is partly, but not altogether, just. The diagnosis of pleural effusions in infancy—and it matters not whether the fluid is serous or purulent, the signs being the same in each—is sometimes extremely easy; while at other times, especially when the amount of fluid is small or when the fluid is situated in unusual places (interlobar, diaphragmatic, etc.), it may present difficulties baffling to the most careful and experienced examiner. These difficulties are materially increased in infancy because of the tendency of the physical signs at this age to differ grossly from those characteristic of effusion in adults, and because of their strong

* Read before the First Annual Meeting of the New Jersey State Pediatric Society, Atlantic City, N. J., June 27, 1910.

resemblance to those of pneumonia. Anyone who has had much experience with sick children, either in consultation work or with the class admitted to children's hospitals, is aware that mistakes in this respect occur with comparative frequency: on account of the ill-defined character of the pulmonary symptoms it is easy for even a careful man to fall into error. It is by reason of these facts and the salutary lessons learned from more than one sad experience, the result of my own blunders, that I have been led to call attention, anew, to some important points in the diagnosis of pleural effusion in infancy.

Although one may engage in general practice for years and encounter but few instances of pleural effusion in babies, the affection is not uncommon. For instance, among 4,045 consecutive admissions, for all causes, of infants under twenty-four months, there occurred 544 (or 1.34 per cent.) pleurisies with effusion (Records of the Children's Hospital of Philadelphia); and Goodhart found that 25.50 per cent. of all effusions in children occurred during the first two years.

As it can be positively stated that pleurisy, whether serous or purulent, is never primary, so a complete knowledge of the affections precedent to the condition is of great value in arriving at a diagnosis. Of these, pneumonia is the most important: all but 5 (or 90 per cent.) of the Children's Hospital cases, already referred to, gave a distinct history of pneumonia; and of the remainder at least 2 were probably of that origin. In this connection, it is well to remember that there are transient, superficial and other forms of pneumonia, not recognized by ordinary signs, which may have preceded an apparently primary pleurisy. Occasional antecedents are tuberculosis, gonorrhea, typhoid and scarlet fever and other acute infectious diseases, tonsillitis, septic bone disease, septic wounds, the septic diseases of the newborn, etc. In many of these cases pneumonia precedes the pleuritis. Pneumonia being such a frequent precursor of pleurisy in infants, the possibility of its occurrence should always be kept in mind. Anything abnormal in the course of or after the pneumonic process should invite careful examination and watchfulness. The temperature may never fall, approaching the normal or remaining moderately or irregularly elevated, or even quite high. It should not be forgotten, however, that the course of pneumonia may be prolonged—until the twenty-second day in one of my cases. Very often the crisis occurs; and, usually, after a day or two—

sometimes after the eighth, tenth or fourteenth day—the temperature begins to rise again. But it may not rise at all, or, at least, rise so slightly as to excite little attention, and yet the pulse remains unusually accelerated. This last is important, but is more significant and frequent in older than in very young infants. The pulse, however, may not be quickened. It is well to remember that other complications may be the cause of a postpneumonic rise of temperature; otitis, for instance. I have seen, during the past winter, two infants in which a continuous temperature after pneumonia occasioned repeated examinations of the chest until a discharging ear made the diagnosis clear. As already stated, effusions due to the pneumococcus may occur without any preceding pneumonia, the primary disease being so insignificant as to be overlooked. These are the cases that have given rise to the supposition that a pleurisy may be primary. In such cases the onset may be as sudden as in pneumonia, and, owing to the similarity of the physical signs, may be regarded as such. The effusion following or accompanying pneumonia in infancy may take place with great rapidity, considerable fluid being found in a chest which, but a few days before, gave no, or very indefinite, signs of fluid.

General Symptoms.—Be an effusion large or small there are usually present general signs or symptoms of a more or less distinctive character; the more so, the longer the duration of the affection. The child usually, but not invariably, looks ill. The complexion is sallow or straw-colored (not flushed, as in pneumonia); and, sometimes, there is a puffiness about the eyes, which, in the absence of pertussis or nephritis, is somewhat suggestive of empyema. There is, as a rule, some dyspnea; but there may be no appreciable increase in the respiration, except under exertion or excitement. Indeed, this is often the case. The altered pulse-respiration ratio, so distinctive of pneumonia, is absent. The pulse is usually accelerated, sometimes with total absence of fever; and the latter is apt to be irregular and is usually of low grade. Rigors and sweats are not common, and the latter, if they occur, are seen equally in serous and purulent affections. Digestive disturbances, especially diarrhea, may be present. Cough is frequently absent and seldom very marked, but I have known it to be so troublesome as to be suggestive of pertussis. Indeed, such a cough has, on several occasions, led me to search for an effusion. Abdominal pain is occasionally complained of,

as in pneumonia in the young. In long-continued cases emaciation and anemia are prominent symptoms and are suggestive of phthisis, with which, indeed, empyema is sometimes confounded. The leukocyte count helps but little in the diagnosis of infantile pleurisy, since leukocytosis occurs, also, in pneumonia. It is usually higher in purulent than in serous pleurisy, and is, consequently, a means of differentiating between these varieties.

A noteworthy feature of some cases is the want of correspondence between the general and the physical signs. An infant may not appear very ill, and yet the chest may be full of pus. As a rule, however, the baby does look quite sick, especially in cases of long duration, and the pallor, languor, fretfulness, anorexia, etc., suggest some grave disturbance of health.

Physical Signs.—The physical signs of pleural effusion in infancy differ materially from those met with in adults, their peculiar character being due to physical conditions for which, as yet, no adequate explanation has been given.

Inspection.—Diminution of movement in the affected side, when pronounced, is a valuable sign, but may be absent in infants. Enlargement of the side, especially in large effusions, is another sign of importance; but in infants it is often difficult of appreciation, as there is usually compensatory dilatation of the sound side. More important is the shape of the chest, which is flattened laterally, a feature best demonstrated by the cyrtometer. Owing to adhesions and pulmonary collapse, in cases of long duration, the affected side may actually be the smaller. Bulging of the interspaces does not always occur; indeed, it is not usually recognized that, in very young infants, there may be actual depression and inspiratory recession, even with large effusions. Displacement of the heart's apex is one of the most reliable signs of effusion that we possess, and is very commonly present, except when the amount of effusion is quite small or localized. One must not forget, however, that adhesions may prevent its occurrence and that the apex may be actually displaced to the left in a left-sided effusion, as in a case of E. Smith's. Displacement of the liver and spleen are not of much assistance, because these organs are so commonly enlarged in infancy.

Palpation.—Owing to the thin chest walls and the weakness of the infantile voice, vocal vibrations or fremitus have not the same value as in adults. Often no vocal vibrations can be detected, or they may be *actually well marked or seemingly in-*

creased, even over large collections of fluid. This fact is not usually commented upon by authors, but of its truth I have on several occasions satisfied myself. I am not now referring to the fremitus felt over the compressed pulmonary tissue close to the spine and at the root of the lung, but to a fremitus felt lower down over the dull area. Because of the tendency of young infants to cry when disturbed, localized tenderness, of so much value in detecting small localized effusions in adults, cannot be utilized in these patients. In older infants, on the other hand, such tenderness, especially over the site of the lobar divisions, should, with other signs, always suggest a collection of pus.

Percussion.—Decided flatness or dullness in infants, as in adults, is, next to exploratory puncture, the most reliable sign of fluid that we possess. With the flatness there *is an increased sense of resistance to the percussing finger which is highly characteristic*. Usually, if the effusion is large, there is, above this dull area at the apex, tympanic or Skodaic resonance; but this does not obtain if the amount of fluid is very great or extremely small. J. L. Morse has called attention to tympany at the base of the lung, above the site of the diaphragm, while there is flatness above. This note, which is transmitted from the abdomen, I have also observed. The possibility of its occurrence should be borne in mind. Small and commencing effusions follow the laws governing similar conditions in adults; but even moderate effusions are apt to assume a more horizontal upper line of dullness than in adults, impaired resonance being noted *both in front and behind—a most valuable sign in differentiating from pneumonia*. Unless there is air in the pleural cavity the dullness is rarely movable. In eliciting dullness in infants percussion must be light, else the pulmonary resonance beneath will completely mask the diminution of resonance produced by the fluid.

Auscultation.—The respiratory sounds are almost always bronchial in character—very often as intense as the sniffling tubular breathing of pneumonia. This is heard not only over the root of the lung, but everywhere over the effused fluid—even at the extreme base. Very often the tubular breath has a distant element about it. This bears some relation to the amount of fluid present, being most pronounced with large effusions; but I have known quite moderate effusions to possess this distant character. Occasionally the breath-sounds are simply feeble, but very rarely they are suppressed; and in such cases the bronchial character, especial-

ly the expiratory whiff, can often be brought out by deep inspirations, a device not available in young infants. The bronchial character of the respiratory murmur in pleural effusion cannot be too strongly emphasized, as it seems to be frequently overlooked, with resultant mistakes in diagnosis.

Because of the weak character of the infant's voice and cry little information can be gained from the vocal resonance. In some cases the resonance is normal on both sides; in others, *the most intense, even nasal, resonance may be present*. If the resonance is suppressed or weakened, this is, of course, a sign of much value. A peculiarity occasionally encountered in infantile effusions is that the character of the breathing may alter with change of position, thus bronchial breathing may be heard in the upright position, and breathing less bronchial when the infant is supine. *Râles, both friction and bronchial, may be heard over very large effusions, not only above, but, also, below the level of the fluid*. Hence their presence should not exclude an effusion. Friction râles are, however, rarely heard in any stage of pleurisy in infants.

Localized, Interlobar and Diaphragmatic Effusions.—Localized and sacculated empyemas are extremely puzzling and difficult of diagnosis, and exploratory puncture or operation must frequently be resorted to in order to establish their existence. Many of the so-called latent pleurisies are of this character, but they are latent only because they are not in accessible positions or are so small as to be extremely difficult to recognize by the ordinary signs. Together with the general symptoms of empyema described above there are indefinite local signs of a small collection of fluid. Such collections may occur at the apex rarely; more frequently at the base in the interlobar divisions, or upon the diaphragm. Repeated examinations must be made, and all the symptoms, general and local, carefully weighed. Interlobar collections cause slight dullness along the line of the septa; also indefinite respiratory signs—diminished breath sounds, bronchial or bronchovesicular breathing, friction râles, and feeble or increased vocal resonance, depending upon the size of the abscess. Pearson insists upon a careful comparison of the position of the scapular muscles on both sides, as their position may be altered. Percussion must always be extremely light. Localized tenderness over the interlobar septa is a valuable sign if present.

Diaphragmatic collections of pus are still less distinctive. I have

not recognized during life this form of empyema in infants, and must speak from the observations of others. Dullness low down on the affected side, with displacement of liver or spleen, is suggestive, but, owing to the common enlargement of these organs in infancy, little reliance can be placed upon their position unless the effusion is large. The dullness may vary from day to day as the stomach and colon are distended or collapsed. Dullness from below upward is suggestive; also a difference between the diaphragmatic movements on the two sides. The X-ray should be useful, but I have had no experience with it, and it would be difficult to differentiate small abscesses from consolidation as well as to determine whether they are within the pleura or not. On the whole, the recognition of small, localized collections of fluid is extremely difficult and calls for the highest degree of experience and careful observation.

Exploratory Puncture.—This is the decisive and only absolutely sure means of diagnosing pleural effusion. It is, also, the only method of determining the character of an effusion. In experienced and careful hands the procedure is usually safe, even when the lung is penetrated. I have punctured a great many chests, and individual chests as often as six or eight times at one sitting, and I can recall but one accident, viz., in a boy of two years and a half, who fell into syncope and coughed up blood after exploratory puncture; but in this case there was no fluid, the lung being wounded. I have also seen emphysema of considerable portions of the chest wall follow this procedure. Sudden deaths have likewise been reported. In the *British Journal of Children's Diseases*, October, 1905, is an editorial referring to eight deaths from this cause, and warning against the routine use of the syringe. The fatal issue in these cases is attributed to reflex inhibition of the respiratory and cardiac inhibitory centers in the medulla after irritation of the pulmonary fibers of the vagus: pulmonary hemorrhage may also have some influence in producing the symptoms. There seems to be practically no danger when there is fluid in the pleura, the lung being thus protected from injury. Notwithstanding the possibility of this rare accident, puncture should not be withheld if, after careful and repeated examinations, the diagnosis is still in doubt, since the disastrous results of unrecognized empyema make it imperative that the patient should have the benefit of this crucial diagnostic measure. The needle should always be short, stout and of large caliber.

Variability of the Signs.—A striking feature of the pleural effusions of infancy not generally appreciated is the variability of the physical signs. This has been, *to me*, a source of considerable confusion and an occasional cause of fatal delay. The bronchial breathing and dullness may be more intense on one day than on another. At one examination the interspaces may be flattened or bulging, while at another there may be recession. Goodhart explains this peculiarity by the difference of the inspiratory power at various times, but pulmonary collapse and a distended stomach or colon may also contribute to these variations. *Such variability is never found in pneumonia*—an important diagnostic point.

In conclusion I would emphasize the following points:—

Pleurisy with effusion is a common affection in infants under two years of age. In the vast majority of cases it is purulent. Because of the disastrous, and even fatal, results of delay in, or mistakes of, diagnosis, it should be recognized early so that prompt—that is, *surgical*—treatment may be instituted. The diagnosis is often obscure, demanding, in the highest degree, carefulness, skill and experience. In arriving at a diagnosis, the antecedent affections should be fully appreciated. Of these, pneumonia is by far the most common. The general symptoms, as well as the physical signs, should be carefully weighed and considered. Of these, the latter are the more distinctive. The most reliable signs, in the order of their importance, are (1) exploratory puncture, (2) dullness with a sense of resistance, and (3) displacement of the apex. The other physical signs, so valuable in differentiating effusions in the adult, are uncertain, variable and confusing, and cannot be relied upon in infants. The recognition of localized collections of fluid is especially puzzling, and demands great skill and watchfulness and a frequent resort to exploratory puncture or operation. The latter is safe, even when the lung is pierced, and particularly so when fluid is present. Notwithstanding the rare accidents that have followed this procedure, it should be employed to determine the character of the fluid, and, owing to the distressing results of unrecognized empyemas, it is imperatively demanded in all doubtful cases. The variability of the physical signs is a striking feature in infants and should always suggest an effusion.

PROCTOSCOPY AND SIGMOIDOSCOPY IN INFANCY AS APPLIED TO INFECTIOUS DIARRHEA (PRELIMINARY REPORT).*

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While physicians have used at different times proctoscopic and sigmoidoscopic examination amongst infants, I have nowhere found any mention of such a procedure being used in cases of infectious diarrhea. The immediate inspection of the lower bowel by means of the electro-pneumatic sigmoidoscope developed by Dr. Tuttle, of New York, for use in children and infants, lead to the undertaking of this piece of work. The clinical symptoms and differential diagnosis of infectious diarrhea, which depend to such a large extent on the local intestinal condition and contents, might, it was hoped, be reinforced by local inspection. It was further thought that by immediate inspection local treatment could be more closely watched and the effect of irrigations thus be seen to better advantage.

This development of Dr. Tuttle's instrument offered the possibility of an examination of the intestinal mucous membrane, during life, far higher than previously. Various instruments up to the present time have been used in proctoscopic examination, bi-valve dilators, rectal speculi, and urethroscopes of different lengths and sizes have been employed, all relying on unsatisfactory reflected light. With the young, very active and uncontrollable subject usually attacked by this infectious disease, the slightly pneumatic distension of the bowel with the above-mentioned electrically-illuminated instrument seemed to offer a far less irritating examination where quickness of application was desired.

The instrument used by me was one similar to that described by Dr. W. H. Axtell (*Journal of American Medical Association*, July 23, 1910, p. 314), being a modification of Dr. Tuttle's six-inch pneumatic proctoscope. It was found to be eminently practical, withstanding hard boiling in sterilization, most essential when dealing with infectious cases. Almost universally its introduction was easy and rapid, it gave a clear, well-lighted field when

* Read before the New England Pediatric Society, November 27, 1910.

properly manipulated, and in the majority of cases rendered inspection quite possible even up to the lower end of the descending colon. The slight pneumatic distention prevented trauma of the sensitive mucous membrane by keeping it away from the advancing instrument and gave very little distress. The abdomen always was found to be soft and lax at the end of the examination, care being taken to allow the escape of air in withdrawing the instrument. The only difficulty encountered was the not infrequent presence of liquid contents, spite the fact of recent evacuation of the bowels. The contents during any, even slight, straining of the patient obliterated the light for a few seconds and occasionally left the glass-windowed light more or less covered and opaque. However, the elevation of the buttocks, with the child lying on an inclined plane, we found readily corrected this, and the liquid feces usually immediately fell back out of the field of vision, giving a clear field to work in.

Infectious diarrhea we are told is a disease of the intestines usually affecting the lower ileum and the major part of the colon. This infection is dependent on a local specific infection of the mucous membrane, with its not infrequently associated bacteriemia and toxemia. Pathologically we are dealing with an inflammation of the intestinal mucous membrane, which presents postmortem a catarrhal, ulcerative and, at times, membranous condition. The follicles and lymphoid tissue of the intestines are found to be in a hyperplastic condition. While, as a rule, found after death in the lower ileum, colon, sigmoid and at times in the rectum, no one actually knows of these lesions exactly how low they may extend during life, how numerous they are, nor what is their course.

Clinically, this infection is usually, but not always accompanied by blood in the dejecta of the patients in small and at times considerable amounts. The question of whether this blood in suspected cases could be traced to lesions other than the pathologic conditions dependent on infectious diarrhea, and whether there was to be found any true connection between the amount of blood and existing lesions, were other problems which it was thought might possibly be aided by such local inspection.

For this work those cases were taken which were admitted between August 9 and September 3, 1910, to the wards of the Boston Floating Hospital. Only cases which had had a history of blood in their stools were considered, and of this number only those who were in fit condition at the time of examination were

investigated. Where a second examination was made four days were allowed to pass, so that some visible sign in all probability would be noticed.

For comparison, at the start several cases of indigestion and feeding were examined, whose intestinal mucous membrane it was considered would be likely to be normal. The rectum (ampulla, and valves irregular in shape and position) was easily traced throughout its entire course. Above the pelvic floor the sigmoid for about two-thirds of its length could be inspected. The mucous membrane as described in anatomy was found to be distinctly thicker at first when compared, for example, with that of the throat. It gradually seemed to become thinner as we ascended, of pale reddish-pink color, and looked smooth and glistening. No blood vessels nor solitary lymph follicles were apparent.

I have divided the cases herein reported into three groups. Group A comprises those cases diagnosed as infectious diarrhea which terminated fatally. Group B takes in those cases similarly diagnosed which lived, while, lastly, in Group C, are collected those children who were not diagnosed as infectious diarrhea, but had had blood reported in their stools. Twenty-four in all were examined. Two cases, while in the hospital for nineteen and five days respectively, showed no sign of any blood in spite of the fact of their history, and were discharged with the diagnosis of intestinal indigestion and fermental diarrhea. Their mucous membrane under examination gave no evidence of inflammation, being merely slightly thickened and of a normal color. Of the remaining 22, 9 died (40 per cent. of all cases examined). Of these one-third had complications, which in themselves were enough to produce death (*i.e.*, bronchopneumonia, acute cerebrospinal meningitis, and septicemia with furunculosis). Eight were discharged well, 3 unrelieved and 2 relieved to their own physician or other hospital.

Diagnosis.—This depended on a typical history of diarrhea, with the story of blood in dejecta, a thorough physical examination at entrance, the course of the disease and the findings of dysenteric organisms.

Group A.—All of these children, comprising 9, had been sick on the average of seventeen days previous to their admission. Blood was present at some time, usually just prior to entrance. While under our care all gave a typical picture. They were emaciated, markedly prostrated and restless. They ran tempera-

tures (100° - 104° F.) more or less persistent, which never fell to normal. They all had weak heart action and small rapid pulses (130 - 140). Blood was present in their movements for an average of one-half their stay.

Instrumental Examination.—In general, only one examination was deemed wise on account of the prostration and general condition of the patients. Of this group 7 cases came into the hospital in the active stage of the disease, having fever ranging from 100° - 103° F. These patients all showed most apparent changes. All had a furry mucous membrane granular in appearance, which was much thickened. The color varied from the typical angry red of inflammation to a nasty gray, almost membranous, state. No true membrane was, however, seen. This color was not only present just within the anal ring, but grew intensified as the instrument was passed higher. The surface of the mucous membrane showed various forms of ulcers and erosions; irregular superficial ones, usually the larger of those seen, whose edge was low, not indurated, and whose base was red and angry but not bleeding; on the other hand, we found more frequently, sparsely scattered in the lower portions of the gut, small, round, oval and pinpoint ulcers. These were of a dark dull-red color and possessed a depressed center with a much indurated edge. They seemed to stand a little elevated from the surface of the membrane. The centers of these lesions showed no slough nor necrotic tissue, except after recent silver nitrate irrigation. No distinct bleeding surface was seen, but a general hyperemic appearance everywhere prevailed. The higher the examination progressed it was noticed that the more numerous these small lesions became and grew larger.

The 2 remaining cases, which were also fatal, gave us interesting data; the appearance was, as far as we could see, normal, slightly thickened, of a pale-pink color, no ulcers appeared, nor could any signs of enlarged follicles nor scar tissue approaching healed lesions be seen. One of these cases had been sick eleven days before entrance, had a temperature of 100° F.-normal, a pulse of 120 - 130 , blood for sixteen days out of twenty-four days while in the hospital, and had on the day of examination three out of four stools containing blood. The mucous membrane, however, showed no ulcers and seemed apparently normal in color. The other case was sick fourteen days prior to entrance, had no temperature while in the hospital, a pulse of 120 , pus and

blood for one-quarter of the time, but no blood on day of examination, and also had, as far as we could see, a normal intestinal mucous membrane.

Blood was present in 7 out of the 9 of the above on the day of examination, and ample pathologic conditions dependent on the infection were found in the mucous membrane to explain such hemorrhage. No other traumatic causes could be found. The only hypothesis for the appearance of the mucous membrane of the two exceptions above mentioned is that the blood must have come from lesions higher up, as the lower parts seemed to be in such healthy healing state.

Group B.—The children of this group, comprising 11 in all, show a contrast when compared with the preceding class. They were sick for a much shorter time before entrance (an average of eight days), were fairly developed and nourished, and only moderately prostrated. Six presented a temperature of 100°-103° F., 4 from 98.6°-99° F. When present this temperature fell, as a rule, to normal in three days. The pulse, while on the average of 110, never showed any signs of weakness, and blood was present in the stools for an average of one-third of their stay in the hospital.

Instrumental Examination.—As these patients were less prostrated than those of Group A, more of them were examined a second time and some a third time. In all, eighteen examinations were made; 5 had more than one, 3 had three, and 2 had two examinations. In general, at the first examination all presented a membrane which throughout was thickened and generally was red and inflamed. All showed moderate prominence of the follicles in the upper rectum and sigmoid, and all but one the various forms of ulcers as seen in Group A. These ulcers were about as numerous as in the preceding group but smaller and less distinct. Subsequent examination showed a gradual healing of all these lesions. The mucous membrane, as before mentioned, became pale, glistening and lost its thick look.

Blood was present in the movements of 8 out of 11 at the first examination and rapidly disappeared, as a rule, from the stools. From the above, it seems fair to state that these cases showed similar lesions to those found in the severer type of this infection, but that probably the less virulent infection quickly responded to treatment and gave us clinically less temperature, fewer symptoms and a more rapid convalescence.

Group C.—This group embraced those cases which, with a history of blood before entrance, were nevertheless diagnosed as non-infectious diarrheas. They numbered 4 in all. Three were called fermental diarrhea and 1 indigestion. They were sick for an average of four days prior to entrance, had a temperature when admitted of 101° - 98.6° F., a pulse of not more than 110, and never showed any signs of prostration. Blood was found in the dejecta of 3 fermental cases only (1 had it for four days out of thirty-five, 1 had it for two out of nineteen days, and the third for twelve days out of twelve days).

Instrumental Examination.—The first 2 of these fermental cases showed a normal mucous membrane, the third one presented a red, slightly excoriated condition, with small pinpoint ulcers similar to those seen in the milder infectious diarrheas. The 1 remaining case of indigestion had a normal examination with the sigmoidoscope, no blood during all its stay and negative bacterial findings for dysentery bacilli.

The "gas bacillus" was discovered in the first 2 cases. The third case with blood had no bacterial examination for some unknown reason, and therefore may be questioned as to the correct diagnosis. This group seems to bring out the fact that blood may be present in fermental cases, while the mucous membrane is found to be normal, thus making the bacteriologic examination of the stools of the patient all important.

Conclusions.—From the local study of the mucous membrane of the foregoing cases, few as they are in number, we can draw certain conclusions.

That cases of diarrhea which have a history of blood in their stools (especially among infants)

(1) Show signs of inflammation (red, thickened mucous membrane, prominence of the follicles, ulcers of varying types, but no true membranous condition) throughout the sigmoid and rectum, especially during the acute stage of the disease;

(2) That these lesions seem to vary according to the virulence of the infection as to number and general appearance;

(3) That these lesions gradually become healed, leaving no signs nor evidence of scar tissue visible to local sigmoidal inspection in life, and

(4) That blood and normal intestinal mucous membrane may be present at least in the sigmoid and rectum in cases of fermental diarrhea.

Having considered these cases from a clinical and pathologic standpoint as regards local inspection with the sigmoidoscope, a third problem, therapeutic in character, presented itself. What, if any, could be seen of the effect of local treatment, especially following irrigations of silver nitrate?

Of the severer type of cases all but 2 received one or more irrigations, 3 had four, and 2 received none. It can be said no sign of any healthy appearance was found, neither did the mucous membrane of those treated, or those untreated, differ in any appreciable way. Of those cases of milder type, all but 2 received silver nitrate irrigations. Three got a single irrigation early in the disease, 5 had more than two and, at the most, three irrigations. While a gradual improvement was apparent at the end of these repeated irrigations, at no time did the mucous membrane after a single treatment show any distinct betterment.

What further can be developed from such a study is mere conjecture. This experience would seem to show that few cases receive any evident improvement to the mucous membrane by such irrigations.

I wish before I close to thank the other members of the visiting staff of the Boston Floating Hospital for permission in carrying on this work during their service. Further may I express my thanks to those who aided me and made it possible to report this study—Dr. W. E. F. Faulkner, of Boston, and Mr. Eutis, of the fourth year class of the Harvard Medical School.

(From the wards of the Boston Floating Hospital.)

GASTRIC JUICE IN THE PATHOGENESIS AND COURSE OF PYLORIC STENOSIS IN SUCKLINGS.—Engel concludes, from his observations on sucking infants, that for a few weeks before the appearance of the pyloric stenosis there is a marked increase in the gastric secretion. At the same time with this excess of secretion a spastic closure of the pylorus occurs. Whether the spasm of the pylorus is part of the same process or the result of the excess of gastric juice is not definitely proven. After the acute stage of excessive secretion there remains a chronic non-spastic narrowing of the pylorus, and in this stage the signs of gastric stasis occur. The stasis of fat established by Tobler is an especially characteristic sign of retention. This author thinks the anomaly of secretion is the root of the trouble.—*Boston Medical and Surgical Journal.*

ACUTE LYMPHATIC LEUKEMIA IN AN INFANT WITH LEUKOCYTE COUNT OF 1,330,000.

BY BORDEN S. VEEDER, M.D.,

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The following case of acute lymphatic leukemia occurring in an infant of seventeen months is of interest from the exceedingly high leukocyte count. There are about 50 cases on record of lymphatic leukemia in childhood, and of these less than 10, including 2 congenital cases, have occurred in infants under two years of age. Benjamin and Sluke,¹ in 1907, collected 41 cases of the lymphatic type occurring in children, including Churchill's² report of 24 cases in 1904. I have been able to find 9 cases reported since their paper appeared, but an analysis of these does not give any additional information of value.

The count in my case, which reached 1,330,000, is the highest leukocyte count which I have been able to find on record in lymphatic leukemia in childhood. Hutchinson³ reports a case of the myelogenous type in a girl of five years whose blood showed 1,590,800 white cells. A case of the lymphatic type in a girl of seven years with a count of 1,100,000 was reported by Breglinz.⁴ One of the so-called congenital cases reported by Lommel⁵ showed a count of 1,240,000 lymphocytes.

Pepper,⁶ in 1908, collected a number of cases of leukemia of all varieties with high leukocyte counts—his search, however, being principally devoted to cases of the chronic lymphatic type. He could find but 9 cases with a count of over 1,000,000 and came to the conclusion that in the chronic lymphatic type there is no essential difference between the cases with excessively high counts and those with the more customary figures. As an autopsy was not permitted in my case, this point could not be studied in detail, but a study of the clinical manifestations leads to the same conclusions in the acute type of leukemia.

Case History.—E. H., female, age seventeen months, white. Russian-Hebrew parentage. Admitted to the service of Dr. Charles A. Fife, St. Christopher's Hospital, on July 19, 1910.

The child was brought to the hospital for a purpuric eruption, which was said to have appeared five days before admission. The parents did not speak English and the mother was in an hysterical

condition, so that practically no history could be obtained. We learned that the child had been breast-fed and that a swelling of the neck had appeared "some time" before the eruption.

The patient was seen by me the next morning, when the following notes were taken:

Physical Examination.—Well developed female child of apparently eighteen months of age, in good condition of nutrition. Skin pale and shows a widespread purpuric eruption varying in size from small, bright red petechial spots about pinhead in size, to large subcutaneous extravasations, cyanotic in color, and about the size of a twenty-five-cent piece. The large extravasations are present over the forehead, extensor surface of the forearms, the tibiae, and over the spines of the lumbar vertebrae; the smaller lesions are most marked over the face, right shoulder and the legs. Pressure over the bones does not produce pain nor signs of tenderness. The joints are uninvolved. The mucous membranes of the mouth are pale, but show numerous points of hemorrhage. Saliva is slightly blood-streaked. The tonsils are large, swollen and red, almost shutting off the mouth cavity from the pharynx.

The cervical lymph nodes are enlarged and palpable. They are moderately soft in consistency and about the size of a hickory nut. Pressure over the right side of the neck seems to cause pain. The axillary and inguinal nodes are both enlarged and distinctly palpable as separate tumors about the size of lima beans.

Chest.—Expansion equal on both sides. The note over the left lung at the apex anteriorly is impaired and the impairment increases until the note becomes quite dull at the fifth rib in the midaxillary line. The breath sounds over this area are slightly tubular in character. Posteriorly inspiration is slightly roughened over both lungs.

The area of cardiac dullness extends from the midsternal to the nipple line and as high as the third rib. Auscultation gives a reduplicated first sound at the apex.

Abdomen.—About normal contour. Liver dullness extends from sixth rib to three inches below the costal margin in the right midclavicular line. The left side of the abdomen is almost completely filled by a large, smooth tumor mass. It reaches from the fifth rib to 3 c.m. below the costal margin in the left midaxillary line, and extends forward to 1 c.m. of the midline of the body, and as far down as 3 c.m. above the crest of the ileum. The anterior edge is rounded and a distinct notch is palpable.

LABORATORY REPORTS.

Urine.—Yellow; slightly turbid, with a white flocculent sediment. Acid reaction; specific gravity, 1.022; albumin, cloudy; sugar, negative; indican, trace. Microscopically, shows a slight amount of mucus, few epithelial cells and many leukocytes; no casts.

Feces.—Black color. Resemble melted tar in consistency and appearance. No curds. Acid reaction. In washed specimen many leukocytes were noted. Positive blood reaction.

Tuberculin.—Von Pirquet—negative.

On admission the child had a temperature of 100° F., which rose to 102° F. at 6 A.M. on the morning following; then fell to normal and remained so on the 20th and 21st. On the morning of the 22d it started to rise again, reaching 104.4° F. at 6 P.M., just before death occurred. The pulse remained between 120 and 130 and the respirations varied from 30 to 45. There was considerable bleeding from the nose and gums and quite a large amount of blood was passed from the bowel. The general condition of the patient became steadily worse from the time of admission, on the 19th, until death occurred, on the 22d. Permission for autopsy could not be obtained.

Blood.—The interesting feature of the case is the blood examination. A leukocyte count was taken by the resident physician after the physical examination on the 20th, and was simply reported as being over 1,200,000.

On the 21st I took several counts, using a Thoma-Zeiss hemocytometer and the count was as follows:—

Hemoglobin, 55 per cent.; erythrocytes, 3,370,000; leukocytes, 1,330,000.

On the day of death the resident reported a leukocyte count of 1,040,000.

Smears were taken on the 21st, and these stained with Wright's and with eosin and methylene blue stains.

The field under the microscope was densely packed with lymphocytes, these being so numerous as to obscure practically everything else. The lymphocytes showed two distinct types, a small and a large cell variety, but between these two extremes there were so many gradations in size that an accurate subdivision of many of the cells into a large or a small lymphocyte was impossible.

The differential count (1,000 cells) was as follows:—

Lymphocytes	985	{ Small, 780 }	(98.5%)
		{ Large, 205 }	
Polymorphonuclears, 12		(2 with eosinophilic granules)	(1.2%)
Myelocytes	3	(2 with basophilic granules)	(.3%)

One nucleated red was found during this count.

It is to be regretted that an autopsy could not be obtained, but the clinical picture of the enlarged glands with the immense splenic tumor, together with the blood count, make the diagnosis of leukemia a certainty. The duration of the splenic tumor and the glandular enlargement is uncertain, but the presence of so many of the large variety of lymphocytes in the blood picture, together with the purpuric symptoms, lead me to classify it as a case of the acute type of lymphatic leukemia.

2033 Locust Street.

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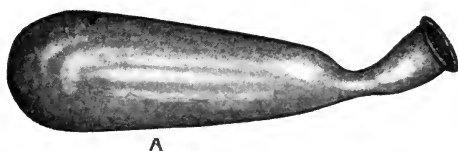
DIPHThERIA BACILLI AS A CAUSE OF SEPSIS.—F. Hesse (*Deutsch. med. Woch.*, June 24, 1909, No. 25). Although diphtheria bacilli usually stay localized at one point in the body and send their toxins throughout the system, cases have been reported in which the Klebs-Loeffler bacillus has been found in the different organs postmortem. There have also been reported a few cases where this bacillus has been found in the blood of the living, but in a mixed infection. Hesse reports a case of a pure culture of diphtheria bacilli being obtained from the blood of a patient giving signs of a septicemia, presumably of streptococcic origin. When the true nature of the septicemia was discovered, diphtheria antitoxin was given, but without effect. Thus his case shows again the value of making blood cultures in doubtful cases in order that appropriate treatment may be instituted. For in this case had antitoxin been given early the result might have been different.—*Boston Medical and Surgical Journal*.

A SIMPLE APPARATUS FOR DRAWING BREAST MILK.

BY CHARLES HERRMAN, M.D.,
New York.

This apparatus was devised by Dr. Siegfried Weiss, of Vienna, and was described by him in the *Archiv. für Kinderhk.*, Vol. LII. It consists of a glass flask about 8 inches long and 2 inches in diameter at its widest part, shaped as shown in the illustration (A). It has a capacity of about 6 ounces.

Before using the flask it is washed out carefully, filled with boiling water and quickly emptied. The edge is dipped for a few seconds in cold water so that it will not burn the skin when applied. The neck of the flask is then placed over the nipple



A



B

- A. Flask for obtaining milk.
B. Nipple to convert flask for feeding.

and pressed against the skin. As soon as the flask begins to cool the nipple is sucked into the neck and milk flows in fine streams. In order to increase the rapidity of cooling and thereby the force of suction, a cold towel is wrapped around the flask. If the breast contains milk, 2 or 3 ounces can be obtained. The flask is removed slowly, so as to cause no pain. After using it is immediately washed and thoroughly cleansed with porcelain shot and brush, and then boiled in soda. This is especially important when the flask is used as a feeding bottle. In order to use it in this way a special nipple (B) is placed over the neck and the flask given directly to the infant. I have used the apparatus for nearly a year and have found it in every way satisfactory. Its advantages are its simplicity and cleanliness. The suction force is greater than that obtained by the ordinary rubber bulb apparatus.

The principal uses are: drawing the breast milk for infants too weak, or for any reason unable, to draw it themselves. Frequently we have mothers in the maternity ward who have more

than enough milk for their own baby, but object to putting a sick or atrophic baby to the breast. In such cases it can be drawn and utilized in the babies' ward, where it is indispensable. It is useful as a suction cup in cases of caking or beginning mastitis where the Bier treatment is indicated, and in women with retracted nipples to draw the milk and at the same time assist in making the nipples more prominent.

The method might also be of some value in furnishing breast milk to the babies of the well-to-do. The difficulties and the annoyances connected with the hiring of a wet nurse are so great that many prefer to resort to artificial feeding; besides, in such cases the wet nurse's baby never gets "a square deal." If such mothers could be kept in a convalescent home they could take care of their own baby, give it the breast in whole or in part; the excess milk could be drawn several times a day, and sold at a price commensurate with the very great value of such material. By an equitable division of the revenue obtained, the mother would have a small fund to meet expenses after her return home.

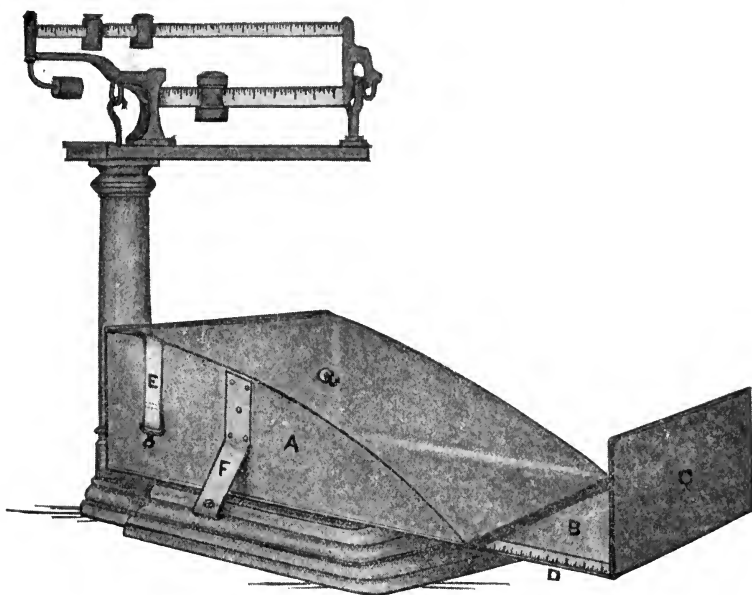
250 West 88th Street.

THE TUBERCULOUS GLAND: ITS SIGNIFICANCE AND TREATMENT.—R. W. Philip (*Lancet*, July 2, 1910) describes the changing point of view in regard to the wisdom of operating on all cases of tuberculous glands; twenty years ago this was considered the only treatment; to-day it is not so. Suppuration in a gland is relatively uncommon as compared with the occurrence of infiltration; in the greater number of cases it is but an incident, which oftener than not does not take place. He describes what he considers to be the usual course of infection from the throat to the glands of the neck and thence, in many cases, to the thoracic lymphatics and to the lungs. As infection so frequently occurs in childhood he urges that children be taught to care for their teeth and throats in a most careful way. He discusses the limitations of operative treatment and the great value of vaccine therapy, with remarks on procedure and dosage. He concludes: (1) Watch for the earliest indication of involvement of lymphatic glands in young children and regard such as certainly of a tuberculous nature. (2) Treat the throat and mouth locally and in general by tuberculin. (3) If there be suppuration, evacuate it in simple fashion, but continue the use of tuberculin.—*Boston Medical and Surgical Journal*.

A SCALE PAN FOR SIMULTANEOUSLY WEIGHING AND MEASURING INFANTS.

BY CHARLES HERRMAN, M.D.,
New York.

The pan is similar to that devised by Variot, of Paris. I have made some slight modifications. Its construction is shown in the illustration. It is 10 inches wide, at the head 7 inches high, when closed 20 inches long, and when fully extended 32 inches long. The foot piece (C) is 4 inches high. It consists of two parts,



the main portion (A) attached by clamps (F) to the platform of the scale, so constructed that it can be readily detached. The foot piece (B) slides easily in and out, so that it can be accurately and quickly placed against the sole of the foot. At the head there is a chin strap (E) which is permanently attached at one end and hooks up at the other. Its length can be adjusted to the size of the infant. Its object is to prevent the head from moving from

contact with the head piece; however, it is not indispensable; the child can be steadied by placing one hand on the chest and the other on the knees. The vertex is then in contact with the end of the pan and the soles of the feet with the foot piece. The weighing and measuring can be done in a minute, the latter accurately to within an eighth of an inch on the scale (D). As the increase in length is nearly an inch per month during the first six months, it is not difficult to determine the rate of growth. The pan has the advantage over many in use in that it is steadier, setting flat against the platform and clamped thereto. It is also deeper, so that there is less danger that the child will fall or climb out.

Variot, Freund, and in this country Fleischner, have shown the importance of registering the gain in length as well as the gain in weight during the first year. In the various forms of dwarfism the relation of height to weight is interesting and sometimes of diagnostic value.

INFANTILE KALA AZAR.—C. Nicolle (*Annal. de l'Institut. Pasteur*, May 25, 1909) has worked for some time on infantile kala azar, and describes the disease as similar to the kala azar Indow, only that it occurs in infants and children, while the Indow type rarely, if ever, does. He reports about 11 cases, and thinks there are many overlooked which will appear when the disease is better known. The symptoms are a progressing anemia, irregular fever and gastrointestinal disturbances. If this irregular fever cannot be checked by quinin the disease should be more than ever suspected. Marked emaciation is another symptom. Physical signs, besides the emaciation and anemia, are enormously enlarged spleen, slightly enlarged liver, enlarged glands, bronchitis. Of the inconstant symptoms, hemorrhage is the most common; also there are at times purpuric eruptions, slight edema and joint pains. The duration of the disease is months and years. The majority of cases terminate fatally, but this author believes spontaneous cure possible. As the cases occurred in poor surroundings, the treatment and blood picture have been poorly worked out. The pathologic findings are enormous hypertrophy of spleen, slight hypertrophy of liver, red color of bone marrow. In these three organs the parasite is found very frequently; in other organs, rarely. The parasite is a protozoön in the Leishmania class and corresponds entirely with *Leishmania donovani* and *Leishmania tropica*.—*Boston Medical and Surgical Journal*.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

*Joint Meeting with the Philadelphia Pediatric Society, Held
December 8, 1910.*

DR. ELI LONG, CHAIRMAN.

OBSERVATIONS UPON 300 CASES OF ACUTE MENINGITIS IN INFANTS AND YOUNG CHILDREN.

DR. L. EMMET HOLT presented this paper, which was read by Dr. John Howland. He stated that with the introduction of lumbar puncture the diagnosis of acute meningitis entered upon a new phase. This was quite as important an advance in this group of diseases as was the adoption of throat cultures in diphtheria and other throat affections. Lumbar puncture had been systematically performed upon all suspected cases in the Babies' Hospital during the past five years. The observations included in this paper related to 300 cases of acute meningitis seen in this hospital in children for the most part under three years of age. Of this number 197 had been observed during the lumbar puncture period. Etiologically, the 197 cases were divided as follows: Tuberculous, 138; pneumococcus, 22; meningococcus, 24; staphylococcus or streptococcus, 10; bacillus influenza, 4; colon bacillus, 1. Two mixed infections were counted twice. During the last five years lumbar puncture had been performed about 1,000 times, and after simple lumbar puncture no accidents had occurred. In a single instance in which repeated punctures were made, secondary infection did occur. In another case an alarming collapse occurred after the injection of about 35 c.c. of serum. While too much could not be said in favor of the procedure it required considerable skill and as strict asepsis as any surgical operation. The term "simple meningitis" no longer had any significance and should be dropped. There was not the slightest doubt but that the largest proportion of cases so classified belonged to the tuberculous group. Beginning with the smallest group, Dr. Holt considered colon meningitis. He reported 2 cases in which the colon bacillus was responsible for the meningitis. Both cases were infants four weeks old; in one there were no symptoms pointing to visceral lesions, while the other, it was reported, had suffered from a urin-

ary infection due to the colon bacillus. The first child succumbed; the second recovered but developed a secondary hydrocephalus. Cases of influenza meningitis were rare and resembled the meningitis due to the meningococcus. It was only by lumbar puncture that a diagnosis could be made. These cases all ended fatally, and so far as he could learn this was the almost invariable termination. In 3 of the cases the bacillus was found in the throat cultures and in cultures from the nasopharynx, thus suggesting the nasal mucosa as the port of entry. Meningitis from pyogenic organisms occurred infrequently, and it was rather striking that in 6 out of 10 cases in his experience it had occurred in newly-born children, and in 5 of these cases it occurred secondarily to spina-bifida. Dr. Holt said that his experience led him to question whether the dangers of meningitis from cases of otitis or mastoiditis were as great as they had been represented. It was his opinion that in patients under two years of age, meningitis from a neglect to perform the mastoid operation was one of the rarest occurrences. In regard to meningococcus meningitis the author stated that the number of cases coming under observation, 24, was too few to admit of generalizations. Fourteen children had received serum treatment, of whom six recovered and eight died. In several of the cases which ended in recovery the nervous symptoms were slow in disappearing. Inability to support the head sometimes persisted for two or three months, and in 2 cases evidence of moderate intraventricular effusion persisted for several weeks, but finally disappeared. The striking features had been the irregularity exhibited in these cases, the slowness of recovery and the large doses of the serum required in those who did get well. Of 10 cases which received no serum 3 recovered and 6 died; 1 was discharged unimproved and doubtless died soon after. Pneumococcus meningitis was clinically of shorter duration than any of the other forms, possibly excepting that form due to influenza. In 8 of 22 cases it lasted three days or less; in two-thirds of the entire number it lasted six days or less. It presented greater difficulties of diagnosis than any of the other forms, because the lesion was usually most marked at the convexity of the brain. Opisthotonos, irregularity of the pulse and respiration, cranial nerve involvement and distention of the fontanel were usually wanting. This form of meningitis occurred in younger patients than either cerebrospinal or the tuberculous form. Half of their cases occurred in infants under six months

of age, and two-thirds were under nine months. It was Dr. Holt's opinion that pneumococcus meningitis was the result of a generalized pneumococcus infection. This had been confirmed by finding the pneumococcus in the heart's blood in every one of 7 cases of pneumococcus meningitis in which cultures had been made. The writer felt sure that the great frequency of tuberculous meningitis was not appreciated. It occurred in 70 per cent. of their cases of acute meningitis, apart from the epidemic of cerebrospinal meningitis. During the past four years 8 per cent. of their hospital deaths had been from this cause. In general practice tuberculous meningitis was very often overlooked or a mistaken diagnosis made. Of 30 successive cases admitted to the hospital, in only 3 was the diagnosis of tuberculosis meningitis made, and in only 3 others was it suspected. Two common misconceptions regarding tuberculous meningitis were that it was a disease of long duration, whereas it rarely lasted over five weeks; the second error was the impression that tuberculous meningitis usually affected delicate infants. This did not mean that healthy infants were more prone to the disease, but that a tuberculous infection in a young child was very apt to involve the brain early before there was time for the symptoms which resulted from general tuberculosis to be manifest. In tuberculous meningitis bacilli were always present in the cerebrospinal fluid; although difficult to find in the early stages, in the later stages a careful examination should disclose them. The von Pirquet test in most cases gave positive results. Pulmonary lesions were present in nearly all cases. Tuberculous meningitis was of human origin, the most frequent cause being exposure to adults with pulmonary tuberculosis. By far the larger number of cases occurred during the late winter and spring. The seasonal occurrence and the age incidence were points not yet fully explained.

THE CONSTANT PRESENCE OF TUBERCLE BACILLI IN THE CEREBRO-
SPINAL FLUID OF TUBERCULOUS MENINGITIS: WITH OBSERVA-
TIONS UPON CEREBROSPINAL FLUID IN OTHER FORMS
OF MENINGITIS.

DR. JOSEPHINE HEMENWAY read this paper. A systematic effort had been made in the laboratory of the Babies' Hospital to determine the presence of tubercle bacilli in the cerebrospinal

fluid of cases of tuberculous meningitis; 138 had been admitted since March, 1906, but fluids for examination were obtained 137 times only. In all but two the tubercle bacilli were demonstrated in the cerebrospinal fluid. The technique which had resulted in such satisfactory results Dr. Hemenway gave in detail. There was but little doubt that the bacilli were more numerous late in the disease, yet there were found in the first puncture 117 cases; in the second, 13, and in the third, 4. Most hospital cases were not admitted until symptoms were tolerably well marked. Therefore, it was somewhat difficult to say how early in the disease the bacilli might regularly be found. On an average the first puncture was made about ten days before death. Examination of the cerebrospinal fluid was made in 22 cases of pneumococcus meningitis. The fluid in 20 could not have been distinguished macroscopically from turbid fluids in other forms of meningitis. The cells were chiefly polymorphonuclear; the organisms were plentiful in the smears, and grew readily in cultures. The cerebrospinal fluid in 4 cases of influenza meningitis all showed great turbidity, the cells being practically all of the polymorphonuclear variety, and the influenza germs were readily cultivated. In a series of 24 meningococcus cases, the fluid from 22 showed the usual turbidity, great numbers of polymorphonuclear cells, and the presence of the meningococcus in the smears and by culture. From a study of some histories she gave, the question arose whether there might not be a definite meningeal inflammatory lesion present with, at the same time, a clear cerebrospinal fluid from which no organism could be cultivated. In 10 cases of streptococcus meningitis the fluid from each showed great turbidity. There were many polymorphonuclear cells present, and the streptococci were present in large numbers, and grew readily on the ordinary media. There were 3 cases in which more than one type of organism was found. Tests with Fehling's solution were made upon all fluids to determine the diagnostic value of the presence of a reducing substance, but the results were so inconstant that no reliance could be placed upon this test in differentiating between tuberculous and other forms of acute meningitis.

The globulin test of Noguchi had been used recently; 17 cases of meningitis (8 tuberculous, 5 meningococcus, and 4 influenza) all gave typical positive reactions. This test appeared to be of great value in differentiating the normal from the abnormal fluids.

INFLUENZAL MENINGITIS AND ITS EXPERIMENTAL
PRODUCTION.

DR. MARTHA WOLLSTEIN read this paper. The employment of lumbar puncture as an aid in diagnosis had established the fact that the influenza bacillus was a not infrequent cause of seropurulent meningitis. Influenzal meningitis appeared to be a very severe and highly fatal form of meningitis and to be exceeded in respect to its fatality only by the pneumococcus and tuberculous forms. Within the past year 8 cases of influenzal meningitis had come under her observation; the influenza bacillus was isolated in every case from the fluid removed by lumbar puncture. All the cases terminated fatally. The influenza bacillus was a slender rod, somewhat varying in size, staining deeply at the poles, and being Gram-negative. Its invariable and most prominent characteristic was its hemophilic property, next to which pleomorphism was its most striking attribute. It may be considered as conclusively established that a pseudoinfluenza bacillus producing pathologic conditions in human beings did not exist. The cultivation of the influenza bacilli dealt with in her paper was done exclusively upon agar mixed with rabbit's blood. At the Babies' Hospital for the past two winters it had been the custom to take cultures on blood-agar plates from the pharyngeal and bronchial secretions of almost every child admitted; in this way they had collected a considerable number of strains of the influenza bacillus and numerous data on its occurrence in the body of children during life and after death. The cerebrospinal fluid in the 8 cases was, without exception, cloudy and deposited on standing a whitish or yellowish sediment, the supernatant liquid remaining decidedly turbid. They all showed the presence of polymorphonuclear leukocytes in abundance. The morphology of the bacilli varied greatly. It was possible that the influenza bacillus might be present in the cerebrospinal fluid without setting up a meningitis, in which case the fluid would be clear provided the number of bacilli was not great. An effort was made to cultivate the bacilli upon plain-agar, sheep-serum-agar and blood-agar. No growth was obtained on the first two media, but a growth was always obtained on the last one. The pleomorphism of the bacilli was brought out clearly by observing cultures from day to day.

The bacilli were inoculated into mice, guinea-pigs, rabbits and monkeys. The most important of this series of animal experi-

ments were those which were conducted with monkeys. They succeeded in producing in two species infection of the meninges, by injecting suspensions of the influenza bacilli into the subdural space by means of lumbar puncture. The results of the inoculation of monkeys into the subdural space of the spinal cord with virulent culture of the influenza bacillus indicated that an experimental form of influenzal meningitis could be produced, which tended to run a rapidly fatal course, in this respect resembling the clinical disease occurring spontaneously in human beings.

Agglutination reactions were not satisfactory, and no differentiation of strains was possible by this method. Opsonins were but slightly more satisfactory. Complement tests were out of the question.

From all the facts given it would appear that the influenza bacilli isolated from the cerebrospinal fluid from the cases of meningitis were identical with the bacilli commonly obtained from the respiratory tract and that the chief difference between the bacilli met with was one of virulence. The frequent findings of the influenza bacillus in cases of endocarditis, purulent arthritis, empyema, appendicitis, peritonitis, meningitis and otitis, as well as their frequent occurrence in the bronchial and nasopharyngeal secretions in cases of clinical influenza, indicated that this organism, like the pneumococcus, was capable of causing inflammations of the serous and mucous membranes anywhere in the body.

The upper respiratory tract would appear to be the most frequent portal of entry for the influenza bacilli and to account for their frequent localization in the middle ear, bronchi and lungs. Whether the meninges were infected directly through the lymphatic connections existing between the upper nasal mucosa remained an undecided question.

The great preponderance of cases of influenzal meningitis among young infants, and its very high mortality, were very striking, as was the opportunity which lumbar puncture gave for early and correct differential diagnosis in this disease.

DR. J. P. CROZER GRIFFITH, of Philadelphia, said that when the subject of meningitis appeared on the programme he felt glad to observe that reference to epidemic cerebrospinal meningitis had been, to a large extent, omitted. It would, indeed, have been carrying coals to Newcastle for members of the Philadelphia Pediatric Society to come to New York to discuss the latter subject,

in view of the large epidemic of this disease from which New York has suffered in recent years. After hearing, however, the papers of the evening, the visitors are practically in much the same position. The topic has been treated so completely and in such detail that there remains really little to be said. All that he could do would be to give general impressions not based upon exact statistics. In looking over the records of the Children's Hospital of Philadelphia he found that during the last ten years there had been admitted 239 cases of meningitis, of which number 121 were tuberculous. Although the diagnoses were necessarily primarily clinical, most of them had been confirmed by lumbar puncture, and in many cases by autopsy, also. There must necessarily be a certain proportion in which the diagnosis was not confirmed and was possibly incorrect, but on the whole the figures given may be taken, he thought, as fairly representative of the facts.

So far as his practice outside the hospital is concerned, the great majority of cases seen by him were tuberculous, omitting from consideration those of the epidemic cerebrospinal type. Regarding the age at which tuberculous meningitis is oftenest seen, the majority, he believed, occurred during the first two years of life, although but few of them before the age of six months. In nearly all cases of tuberculous meningitis the disease is clinically meningitis only. That is to say, there is no association of other symptoms. Perhaps the most frequent exceptions are seen, first, in older children suffering from tuberculous disease of the bone, in which meningitis finally develops and causes a fatal ending; and, second, in infancy and very early childhood, in the cases of general tuberculosis, in which the meningitis is only one of the clinical manifestations and often the latest to show itself. At autopsy, of course, tuberculous meningitis is practically never found alone. Even when the chief manifestation, it is probably secondary to a lesion somewhere else in the body, though this may be very small and possibly overlooked.

With regard to the frequency of tubercle bacilli in the cerebrospinal fluid, he agreed with what had been stated. He thought they should be discoverable in the great majority of cases, although long, careful search might be required. As to the von Pirquet test, its absence was certainly a point against the existence of tuberculous meningitis except in the advanced cases where the reaction of the organism is no longer great enough to manifest itself. The presence of a cutaneous reaction of course would not

prove that the case was one of tuberculous meningitis, but only that the tuberculous process existed somewhere in the body. This was a matter, however, so much written about that he did not dwell further upon it.

During the last five years there had appeared in the wards of the Children's Hospital 119 cases of meningitis; 6 of them were proven by means of lumbar puncture to be pneumococcic.

In the matter of lumbar puncture, not only must a bacterial investigation be made, but a careful cytoscopic study of the fluid as well. The common belief that tuberculous meningitis produces an increased number of lymphocytes in the fluid was, he thought, entirely correct, but was open to exceptions. Cases had been repeatedly reported in medical literature where the polymorphonuclear cells were proportionately greater, and he had himself seen instances where the cytoscopic examination, taken by itself, would have suggested that the disease was of nontubercular nature.

DR. JOHN LOVETT MORSE, of Boston, said that as the papers were being read he was reminded of a series of cases which he had recently seen in which the results obtained by means of lumbar puncture and the examination of the cerebrospinal fluid were disappointing in that they were confusing and did not afford a positive diagnosis. He had seen a number of cases of infantile paralysis of the encephalitic type, and some others which later proved to be of the spinal type, in which the spinal fluid was under increased pressure, showed a fibrin clot and increased number of cells per cubic mm. and a large excess of mononuclear cells, usually lymphocytes. In other words, the characteristics of the fluid were exactly those of tuberculous meningitis except that tubercle bacilli were not present. If the fluids were always examined as carefully as were those examined by Dr. Hemenway, the absence of tubercle bacilli would rule out tuberculous meningitis. In routine hospital examinations, however, his experience was that tubercle bacilli were missed in about 90 per cent. of the cases of tuberculous meningitis, so that under these conditions the absence of tubercle bacilli was not of great importance in the differential diagnosis.

A positive tuberculin test was obtained in a number of these same cases which later proved to be cases of infantile paralysis. The presence of a positive tuberculin test in this class of cases is still further misleading, and erroneous conclusions can only be avoided by the very careful examination of the fluid for tubercle bacilli.

DR. EDWIN E. GRAHAM, of Philadelphia, said that the papers had covered the ground so thoroughly, especially what was said regarding laboratory methods, that there was hardly anything left for discussion, and nothing to criticise. The standard set by Dr. Hemenway for tuberculous meningitis was a new one; the finding of tubercle bacilli in 135 of the 138 cases was remarkable. It meant that a new technique had been worked out, which gave accurate and positive results.

In the papers it was shown that the meningococcus was not always found at the first examination of cerebrospinal fluid, especially if this examination was made early, and it is a question as to just how early the tubercle bacillus is present in the spinal fluid of tuberculous meningitis. It has seemed to me, therefore, that any symptoms that were present early in cases of meningitis and were not present when the central nervous system was not involved should be of extreme value in assisting in an early diagnosis, and that it is possible in the enthusiasm displayed in examining cerebrospinal fluid to overlook clinical symptoms which might aid in assisting to make an early diagnosis.

Brudzinski is drawing attention to two symptoms which he claims to be present in meningitis, and not present in other diseases: first, that passive flexion of the head forward causes flexion at the thighs, knees and ankles; second, that there is a concomitant reflex of the leg on one side when passive flexion of the leg on the other side is made.

During the last year and a half, Dr. Graham said he had changed radically in regard to lumbar puncture. Formerly, he had been willing to wait until the symptoms were fairly well pronounced. He could look back and remember cases in which he advised waiting twenty-four or forty-eight hours until the symptoms became pronounced. Now he thought this was a mistake. Lumbar puncture should be done in every case where one had reason to suspect the presence of meningitis.

In cerebrospinal fever that is absolutely necessary from a standpoint of treatment. In the early stages of a severe case of cerebrospinal fever the rapid accumulation and consequent pressure of the cerebrospinal fluid itself had much to do with the presence of certain symptoms. Early and repeated lumbar puncture in these cases will at least ameliorate the symptoms.

Dr. Graham had seen one case of cerebrospinal fever which later died of tuberculous meningitis.

DR. SAMUEL MCG. HAMILL, of Philadelphia, said it was curious how close one could live to facts without recognizing them. Until he had seen Dr. Holt's charts he had never been impressed by the fact that tuberculous meningitis showed such a seasonable tendency. In thinking over the dates of occurrence of 15 cases which he saw during the past year, he thought that all but 2 had been seen between February 1st and the end of May, corresponding, therefore, to the dates indicated by Dr. Holt's tables.

Dr. Hamill said that he was glad to hear what Dr. Holt had to say in regard to the von Pirquet reaction in cases of tuberculous meningitis. Like Dr. Holt, he had gathered from the literature that cases of tuberculous meningitis failed to react; in every case he had seen during the last two years he had been able to demonstrate the reaction to his own satisfaction. He thought, however, that a great deal depended upon one's ability to interpret the reaction. In anemic and emaciated cases there might be practically no area of erythema, only the induration being present. In colored children the interpretation of the result was especially difficult because one must depend solely upon the circle of induration. He regretted his inability to discuss the last two papers, which were extremely interesting and highly valuable contributions.

DR. D. J. MILTON MILLER, of Atlantic City, N. J., thought that Dr. Griffith's figures were misleading in reference to the prevalence of tuberculous meningitis. He understood him to say that, in the Children's Hospital, out of 239 cases of meningitis 121 were tuberculous. Dr. Miller's impression was, without supporting figures, that about two-thirds of them were tuberculous. That was the impression he had when he looked back over the cases treated in his service. The figures Dr. Griffith gave may be explained by the fact that many of them antedated the test by lumbar puncture; that many, therefore, were based upon insufficient data. In many cases the tubercle bacilli were not found, and therefore, to the investigator this was sufficient to exclude tuberculosis. Anyone who had seen many cases of tuberculous meningitis must realize how very variable were the symptoms and how much they differed from those described in the text-book, and, therefore, how impossible it was to make the diagnosis without lumbar puncture.

It seemed to Dr. Miller that the papers read touched upon a moral issue, namely, that tuberculous meningitis was, after all, a

common disease, a fact which was not recognized as it should be by the profession at large, or the public, to whom tuberculosis meant pulmonary consumption only. What had been brought out in the papers should prove a valuable weapon in the hands of those who were fighting tuberculosis. Physicians should impress upon parents how common tuberculous meningitis was, how it attacks little children, and how fatal it was. If parents knew this, they would be much more willing to give financial and moral support in the efforts now being made to stamp out tuberculosis than they now do.

DR. JOHN H. W. RHEIN, of Philadelphia, was very much interested in the papers of the evening, and what remarks he had to make were rather a discussion of the subject than a discussion of the papers.

DR. B. FRANKLIN ROYER, of the Pennsylvania State Department of Health, Harrisburg, Pa., said that acute meningitis was not particularly difficult to diagnose. Out of 167 patients coming under his care in the Philadelphia Hospital for Contagious Diseases during an outbreak of epidemic meningitis, 147 had been properly diagnosed as of the epidemic type, 5 were tuberculous, the others the various acute types of meningitis, several of them following suppurative processes. The diagnosis in practically every instance had been made by the family doctor; in only a few instances had lumbar puncture or other scientific test been applied; in a few cases the Department of Health's laboratories had rendered assistance; in a few resident physicians from the hospital had confirmed the diagnosis already suspected.

Dr. Royer said he was very much interested in studying the chart presented by Dr. Holt showing the frequency of tuberculous meningitis at the various age periods. In Dr. Holt's experience at the Babies' Hospital the tuberculous type prevailed in 70 per cent. of the cases having meningitis, while in Dr. Griffith's tabulation at the Children's Hospital in Philadelphia something more than 50 per cent. of those having meningitis were tuberculous. In the first instance Dr. Holt's tabulation is made in the Babies' Hospital, where children of three and under are received for treatment. In the Children's Hospital, in Philadelphia, where older children are treated, not so large a percentage of them are less than one year of age. Possibly had an analysis been made along exactly parallel lines the difference would not have been great. In older children tuberculous meningitis is less common.

A differential cell count is of value in studying the spinal fluid. With the majority of cells lymphocytes even without bacilli tuberculous meningitis may be diagnosed. Other important aids are valuable. Nothing has been said this evening about an ordinary white cell blood count in the various types of meningitis. In the acute type of the disease, except where the organism is overwhelmed with toxins and the patient is relaxed and flabby, the leukocyte count will run from 10,000 to 15,000 per mm. up to 45,000 or higher. In the tuberculous type, however, he has never met with such a rise in the leukocyte count. Dr. Royer said he did not mean to decry lumbar puncture, as he believed in a careful study of the spinal fluid in all cases, that he had regularly practiced it, and that he had followed through to autopsy practically every case dying under his care.

DR. HERBERT FOX, of Philadelphia, reported two interesting cases.

The first case was diagnosed as a case of gonococcus meningitis. This diagnosis has been questioned many times, but the determination in this case was made by a man of unquestioned ability, upon the facts that the organism could not be grown on the ordinary nutrient media, but required serum media, and that it produced conjunctivitis in the rabbit's eye. The differentiation between the meningococcus and the gonococcus should be made by serum tests and sugar fermentation.

The second case was a man of nineteen years of age with septicemia. After about three or four weeks of his illness he had distinct symptoms of meningitis, which disappeared within two weeks. Several days after the disappearance of this meningitis a pseudodiphtheria organism was found in the blood. Patient died later, but an autopsy was refused.

This type of infection should be borne in mind in connection with middle-ear disease in which the pseudodiphtheria organism was found. The question as to the increase of globulin is very interesting and important. One should not stop at a consideration of the globulin, but should go further. There is a globulin formed in ordinary coagulation. Is it a globulin from nuclealbumin or nucleoproteid, or are there any results of nucleoproteid cleavage? There is undoubtedly a spontaneous coagulation during the early stages of poliomyelitis. Wickman has lately changed his opinion as to the origin of poliomyelitis, formerly believing it to be hematogenous but now considering it lymphadenous. In this con-

nection one should not forget this coagulation, which indicates some alteration in the circulation early in the disease. More study along this line might give light as to the pathologic physiology of many forms of meningitis.

USE AND ABUSE OF PROPRIETARY FOODS IN INFANT FEEDING.—Cantley, in *The London Practitioner*, says that proprietary foods are not really necessary in ordinary circumstances. They are, however, often of very great value, more especially the malted foods, provided that they are used with discrimination as additions to the diet and not as substitutes for cream or milk. Generally speaking, in the first three months of life the only permissible proprietary foods are those made from condensed milk, with or without the addition of cane-sugar, or of a completely malted flour. These foods are also useful, under certain temporary conditions, in the second three months of life. At this age, too, we can make use of the completely malted carbohydrate foods as an addition to the milk mixture instead of sugar; of the more or less malted foods, in a similar manner, provided that they are given in small quantities and do not produce flatulent distention of the intestines; and even of the foods consisting of unchanged starch, especially those which undergo partial conversion in the process of preparation, and, at the same time, partially peptonize the milk proteins. In the third three months of life, mothers constantly clamor for the addition of some food to the milk mixture. Simple barley water, gradually thickened, is sufficient, and will educate the child in the digestion of starch. Almost all of the meat preparations consist of extractives of no nutritive value, perhaps stimulating to the digestive functions, possibly throwing an extra strain on the liver and kidneys. The high proportion of salts and extractives is liable to cause thirst and diarrhea. Diarrhea is especially apt to be induced by peptone preparations. Some of the meat jellies, though not nutritious, have a pleasant flavor and are comforting to a feverish infant who refuses food. They are still more comforting to the anxious mother who fears that her child will starve and has profound faith in these preparations. In small quantities they do no harm. Similarly, a hot, clean fluid, such as beef-tea, is pleasant to the febrile tongue and disordered digestion. As ordinary articles of an infant's dietary, these foods must be condemned.

THE NEW ENGLAND PEDIATRIC SOCIETY.

The twelfth meeting of the New England Pediatric Society was held in the Boston Medical Library, November 26th, 1910. The following officers were elected for the ensuing year:

President, Dr. John Lovett Morse, Boston.

Vice-President, Dr. Charles A. Pratt, New Bedford.

Secretary and Treasurer, Dr. Fritz B. Talbot, Boston.

Council, Drs. Arthur H. Wentworth, Boston; Henry I. Bowditch, Boston; and Francis P. Denny, Brookline.

The following papers were read:

DR. W. P. LUCAS read a paper entitled

EXAMINATION OF SPINAL FLUIDS IN VARIOUS MENINGEAL CONDITIONS IN CHILDREN.

He showed several charts which showed that the cell picture and differential count of cells could not be depended upon in differential diagnosis of the various meningeal conditions in infancy and childhood. He emphasized the fact that the causative organism must be found before one can give a definite diagnosis.

DISCUSSION OF DR. LUCAS'S PAPER.

DR. TALBOT.—Dr. Lucas's paper is a very valuable and important one. My experience with the differential cell count agrees with the results which he has just quoted, but I believe that he has passed over the chemical examination of the cerebrospinal fluid much too lightly and would give one the impression that he thought it of no value. I believe that the test for sugar is of no value, but think that the nitric acid test for albumin is of great significance. In my experience all infections of the cerebrospinal canal show an excess of albumin in the spinal fluid. In the acute stage of poliomyelitis I have found a slight excess of albumin, which disappears with the fever. In the subsequent stages of acute poliomyelitis and in such cases as come under the head of meningismus there is no excess of albumin by the nitric acid test. In many cases other elements, such as cholestrin crystals, are overlooked because the fluid is not examined in the fresh state. I

have found cholestrin crystals and other curious bodies the significance of which I do not understand. It has been suggested that cholestrin crystals are due to the breaking down of the brain tissue. If so, it is a very important observation.

DR. CORIAT.—Regarding the chemical examination of the spinal fluid, I would like to state my experience in the matter. During the five years that I was connected with the Worcester Insane Hospital I had opportunity to do a great many examinations in acute and chronic insanities in adults. In nearly every one of these cases the results were checked up with the microscopic findings in the brain. I found, as the result of my experience, that the chemical examination was of as great, if not greater, importance than the cytologic examination. A great many of these patients were suffering from acute and chronic meningeal affections; principally syphilis and general paralysis. In all these cases cholin was found as a disintegration product of brain lecithin, and when the cholin was quantitated it was found to be exactly parallel with the breaking down of the brain tissue. I also made many examinations of the fresh fluid, but I never found cholestrin, but I found peculiar bodies which resembled cholestrin and what I thought to be lecithin bodies. The sugar is of no value chemically; the albumin I found of great value.

DR. LUCAS, in reply to Dr. Talbot's and Dr. Coriat's remarks.—I did not mean to give the impression that the finding of albumin is of no importance, for I think it is of great importance, as it appears in practically every case where there is a clot formation. It has a very definite connection with clot formation. The presence of albumin is also made use of in studying the cytology in a very much better way than is possible by the ordinary routine methods. Dr. Ayer has reported a comparison of a number of cases studied by this method of Alzheimer with the ordinary laboratory methods and finds that one gets a very much more typical cell picture after hardening the cells in alcohol.

I am glad to see that others have come to the same conclusions as I have on the Fehlings test for sugar in the spinal fluid, for I had given it up as being of no value, whereas some of the English authors consider it a very important test.

DR. DUNN, discussion of Dr. Lucas's paper.—I would like to ask, in those cases of encephalitis mentioned in one of the tables, whether they were autopsied or what the proof was that they were encephalitis rather than some other condition, especially the ones

that died and did not have autopsies. I mean to say, that if there is no method of distinguishing between tuberculous meningitis and encephalitis through the fluid, how was the distinction made in these cases? I would add that I have just been going over almost a similar work as this which comprises a series of 142 cases of various forms of meningitis, and about 83 cases which were clinically mistaken for some forms of cerebrospinal meningitis proved to be some other disease, and the results, as far as the investigation of the fluids was concerned, were just the same as those obtained by Dr. Lucas.

DR. LUCAS, in reply to Dr. Dunn's inquiry.—The question of encephalitis is, I think, the most interesting and difficult one and the one over which the most mistakes are made. The 2 cases which you ask about and which I reported as died were both autopsied. All those cases that died and were not autopsied I have left out of the count, for our laboratory findings leave the question as to whether a case is tuberculous or not unsettled unless the organisms (*tubercle bacilli*) have been found. These two autopsies were both studied by Dr. Southard at the Harvard Medical School. Dr. Southard and I have also seen the living cases since their discharge from the hospital. In all, we studied about 20 such cases, and the record of the spinal fluid of these cases are recorded in the chart on encephalitis.

DR. J. W. COURTNEY read a paper on

THE YOUTHFUL PSYCHOPATH,

in which he concluded that the morbid conditions under consideration are to the observant fully obvious at an early period of life and that by proper treatment their course may, in many cases, be arrested and many a mental wreck thereby averted.

DR. CORIAT, opening discussion of Dr. Courtney's paper.—I was much interested in the points brought out in Dr. Courtney's paper, and while in the majority I fully agree with him, yet there are certain points with which I must take issue. There is no doubt, of course, that in the evolution of the neuroses of children more than in any other forms of disease which occur in children, physical or otherwise, we can apply the old familiar lines, "As the twig is bent, so is the tree inclined." It appears to me that in a great many cases of childhood hysteria paranoia and dementia precox there is a fundamental defect, and, in fact, in one of the most recent theories of dementia precox which has

been brought forward it is based on this defect as the underlying cause. Many of the forms of psychoses can be traced back to early childhood. I regret that Dr. Courtney did not say more about the forms of juvenile crime in childhood. I have had the opportunity of seeing quite a number of these cases, and it is surprising to see how many young boys and girls from seven to fifteen years of age who commit petty infractions of the law are either light cases of epilepsy, of paranoia or even hysteria. Concerning the sexual side of the matter, I think the only way the problem can be finally determined and finally solved is to make a thorough analysis and investigation into the sexual life of children, as Freud has done, who, for instance, devoted 110 pages to the sexual phobia of a boy of five. Concerning the matter of treatment, I fully agree with Dr. Courtney, that most of the treatment should be educational and didactic.

DR. FAIRBANKS, discussion of Dr. Courtney's paper.—I think there can be no doubt that the majority of these cases are congenitally defective. We have, in most of the instances, a decidedly neurotic family history, an indication of family instability, on which, with the gradually increasing complexity of the child's life, abnormal psychoses develop.

In the relatively simple life of the normal child, with its simple experiences, its lack of worry and responsibility, there are no causes for acquired psychical defects. Another protection is the ignorance of consequences of conditions and acts, which protects the child from the strain of anxiety and anticipatory fear. Another shield is the elasticity of the child-psyche, the ease with which emotional impressions in the normal child are recovered from.

But even in a normal child the pernicious teaching or example of the parents or environment by reproducing before the child adult life, with all its morbid fears, anxieties, griefs and complicated processes of thought and experience may bring prematurely to that child the intricate relations of the adult mind to its environment at a time when the child-mind is not prepared by development, and by inhibition and judgment based on experience, to orientate and adjust itself to its environment. In this way the foundation may be laid, even in the normal child-mind, for a disturbance of psychic equilibrium of more or less complexity. Most of our adult anxieties, doubts and fears are based on insistent recurrent thoughts of what may happen as a result of

a given association of circumstances because our experience or the experience of others of whom we know or have heard suggest to us that this or that result may follow in our own case as a necessary corollary of such circumstances. We have here the insistent idea or recurrent worry element that may form for the adult the foundation stones for a more complex neurasthenic or psychasthenic state. But in the normal child, before puberty, we rarely have such a condition developing purely as a result of the child's own experience. If it does so develop in a reasonably normal environment I believe it is only because the child is abnormal from the start; that is, congenitally.

As an example of the effect of environment on a perfectly normal child with excellent family history, I may mention the latest instance that has come under my observation. This is in the youngest of three girls in what we may term an ideal home, in which, for the most part, the most solicitous and wise care has been devoted to the children. Both of the parents, however, have been for years hypersensitive upon the subject of disease and bacteria. All of the dangers lurking about the human being to rob him of his health have been freely discussed before the children throughout their developing years. The children have even been taught to avoid anyone suffering from a common cold, and when they themselves were the victims they have been made to feel that they were a source of danger to every inmate of the household. The only neurosis, if it may be so considered, exhibited by the family is a long existent morbid fear of the father's that he may sometime choke to death. Repeatedly he has interrupted the meals by a pseudo-choking attack. This, and the reported instances of asphyxia the children have seen and heard for years. The youngest of the girls, now twelve years old, a ruddy, muscular out-door child, was engaged in a game of checkers with her sister recently when she suddenly clutched her throat and held her breath, much to the horror of her parents. She was pale but not cyanotic, and after what seemed many minutes to the anxious family inspiration took place with a loud respiratory crow. This attack was several times repeated during the next week and was considered by the family physician to be glottic spasm of serious character. It was, however, a purely functional condition of hysterical nature. Suggestion in the drowsy state, just preceding induced sleep, employed once, has, I believe, been completely effective in preventing the further recurrence to date. The child should

have been further treated, however, and will undoubtedly require it sooner or later.

Hysteria in childhood differs in some respects from that of adult life, and in my experience, especially in the absence of the so-called stigmata, namely, limitation of the visual field areas of anesthesia hemianesthesia, hysterogenic zones along the spines and over the ovaries. They are certainly relatively rare; not absolutely so, however, and I have just reported a very pronounced case where they were marked in a child of eleven. He who refrains from making a diagnosis, however, because they are not present in a child, will often fail to recognize true hysteria when it occurs in childhood.

DR. COURTNEY, closing discussion of his paper.—Dr. Fairbanks has spoken of the absence of stigmata in juvenile hysteria. This is one of the points upon which I laid special emphasis in my paper.

Dr. Coriat has introduced the Freud theory of the sexual genesis of hysteria. With regard to this theory, I will simply say that I strongly object to it because of the mental and moral muck-raking it involves, and, furthermore, because it makes the anamnesis of a female hysteric read more like a scabrous anecdote from Brantome's *vies des dames galantes* than like a serious scientific document. I make so bold as to predict that this esoteric doctrine of Freud will, within the next two years, have passed into a well-deserved oblivion.

The points I particularly wish to emphasize are these: (1) That certain psychoses and psychoneuroses make their debut early in child life; (2) that if they are recognized and properly treated at this time they may, so to speak, be nipped in the bud; and (3) that the opportunity for their early recognition is more often given to the pediatricist than to the alienist or the neurologist. Consequently it is preëminently the duty of the pediatricist to prevent the psychopathic child from becoming a nervous and mental wreck.

DR. HENRY I. BOWDITCH read a paper entitled

PROCTOSCOPY AND SIGMOIDOSCOPY IN INFANCY AS APPLIED TO
INFECTIOUS DIARRHEA.

(For paper in full see p. 36.)

DR. BOWDITCH, closing discussion of his paper.—The introduction of the instrument was at times somewhat difficult. A

certain amount of firm pressure had to be used to overcome the sphincter, but the child did not seem to mind it in the least. With the instrument in place (inserted its full length) the child was perfectly quiet and happy. They strained a little, of course, but we could readily follow the bowels from the rectum, and in the majority of cases could see the dark pocket at the end of the descending colon. Further introduction was impossible. I feel certain that we investigated in all cases the sigmoid for the greater part of its extent as well as the rectum. The pneumatic apparatus led but to one complication, which was at first distressing. When we distended the intestines the air seemed to get above into the colon, causing the child considerable discomfort. I discovered, however, that as I withdrew the instrument by gradually letting the air out the child had as flat an abdomen as before. The amount of blood that came away from the examination was, in the severest cases, never more than half a teaspoonful, and the straining and prolapse of the rectum I have been told was no more than that which occurred every day in these patients.

DISSEMINATED MILIARY TUBERCULOSIS OF THE SKIN AN IMPORTANT SIGN IN GENERAL MILIARY TUBERCULOSIS OF INFANCY.—W. Tileston (*The Archives of Internal Medicine*, July, 1909) reports his observations on a specific eruption which occurs frequently in miliary tuberculosis of infants. It is seen sometimes in patients who do not show a tuberculin reaction, and when present is of greater prognostic value than the positive tuberculin reaction, which occurs in so large a percentage of children of the lower classes. The eruption in question indicates almost certainly a fatal outcome. This eruption is due to the deposit of tubercle bacilli in the skin. The bacilli reach the skin by means of the blood current. The rash consists of scattered discrete papules which at the beginning are the size of pinheads and are soon capped by tiny vesicles with cloudy or purulent contents. The vessel ruptures or dries up and its place is taken by a crust. The lesion is about 2 or 3 mm. in diameter and consists of a flat papule, only slightly elevated, of a dull red color, often glistening. The center of the lesion is marked by a sharply defined hollow. Rarely the lesions may be vesicular, but they also show the characteristic hollow. The majority of the spots occur on the buttocks, genitalia and adjacent portions of the thigh. The author reports 7 cases.—*Boston Medical and Surgical Journal*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. CHARLES E. FARR.

DR. S. FELDSTEIN.

DR. C. D. MARTINETTI.

DR. M. C. PEASE, JR.

DR. G. R. PISEK.

DR. FRITZ B. TALBOT.

PATHOLOGY.

SMITH, WILLIAM H.: A METHOD OF STAINING CAPSULATED BACTERIA IN BODY FLUIDS. (*Boston Medical and Surgical Journal*, November 24, 1910, p. 791.)

The method reported is as follows:—

(1) Make a thin smear from fresh sputum, lung, pleural or pericardial exudate.

(2) Pass through flame.

(3) Cover with 10 per cent. aqueous solution of phosphomolybdic acid (Merck) four to five seconds.

(4) Wash in water.

If the microorganism is Gram-staining like the pneumococcus or streptococcus mucosus capsulatus, stain with,

(5) Anilin oil gentian violet, steaming one-quarter to one-half minute.

(6) Wash in water.

(7) Treat with Gram's solution of iodine, steam one-quarter to one-half minute.

(8) Decolorize with 95 per cent. alcohol.

(9) Wash in water.

(10) Stain with 6 per cent. aqueous solution of eosin (Grubler's w. g.) one-half to one minute, warming gently.

(11) Wash in water.

(12) Wash in absolute alcohol.

(13) Clear in xylol and mount in Canada balsam. The capsule will be found to be distinct, clear-cut, eosin-stained, about the Gram-stained microorganism.

If the microorganism is Gram-decolorizing, after covering the smear with phosphomolybdic acid and washing,

(1) Stain with 6 per cent. aqueous solution of eosin one-half to one minute, warming gently.

(2) Wash in water.

(3) Counter stain with Loeffler's methylene blue one-quarter to one-half minute, warming gently.

(4) Wash in absolute alcohol.

(5) Clear in xylol and mount in Canada balsam. The capsule will appear eosin-stained about the blue-stained microorganism.

Fritz B. Talbot.

ORTON AND DODD: EXPERIMENTS ON TRANSMISSION OF BACTERIA BY FLIES WITH SPECIAL RELATION TO AN EPIDEMIC OF BACILLARY INFECTION AT THE WORCESTER STATE HOSPITAL, MASS., 1910. (*Boston Medical and Surgical Journal*, 1910, Vol. CLXIII., p. 863.)

An organism conforming to the Shiga type of *B. dysenteriae* was recovered from 10 out of 15 cases examined. The *B. prodigiosus* planted in the laundry was recovered from flies caught in traps in the scullery and five screened ward dining-rooms at an interval of from two to six days after the original plant. The typhoid fly—*musca domestica*—breeds in tremendous numbers in decaying vegetable waste of varying sorts. The house fly's egg to adult cycle is ten days, so that vegetable waste should be cared for at least once a week during fly season.

Fritz B. Talbot.

SURGERY.

MATHEWS, FRANK S.: THE RESPONSIBILITY OF THE TONSIL IN TUBERCULOUS ADENITIS. (*Annals of Surgery*, December, 1910.)

Frank S. Mathews says that the tonsil is probably the usual cause of infection of the cervical nodes with tuberculosis, but the infection may come from a back tooth, the pharynx or the nasopharyngeal adenoids. Disease of both tonsils and lymph nodes is very frequent in children. When the tonsil is inflamed the tonsillar nodes at the angle of the jaw are the first to enlarge. Moreover, in at least 90 per cent. of tuberculous adenitis cases in children, the first nodes to enlarge are these same tonsillar nodes. Later in life infection of both tonsil and lymph nodes is less frequent. He quotes Shrady as saying that consumptives rarely develop clinical tuberculosis of the tonsil and that they usually die without clinical signs of tuberculosis of the neck nodes. Fifty-seven tonsils removed from children for various reasons and embracing all types, but in whom there was no suspicion of tuberculosis, were entirely negative on examination microscopically. This confirms the experience of Hodenpyl, Wright and Judd. In

other words, isolated tuberculosis of the tonsil is distinctly rare. In a second series of 5 cases, all of whom had tuberculous cervical adenitis, the tonsils were removed and were all found tuberculous microscopically. In 3 other cases of tuberculous cervical nodes no tuberculosis was found in the tonsil, but 2 of these children had other sources of infection, probably the scalp in one case, the lip, gum or floor of the mouth in the other. The third case was of several months' standing and the clinical evidence suggested tonsillar origin, but none was found. In still another case the cause for a submaxillary and upper chain infection was found to be a tuberculous focus in the gum near the second incisor tooth. Here the submaxillary node was primary. The common belief that the tubercle bacillus may penetrate the tonsil and, without producing lesions, be carried to the cervical nodes has very little basis in fact.

Tuberculosis does not greatly enlarge the tonsil microscopically. The lesions are scattered rather than confluent; ulceration was never present, and there was never more than a suggestion of central necrosis. The tubercles were both superficial and deep; in the capsule in one case. The tonsils should be more frequently removed in cases of node infection than has been done in the past, but it is not wise to attempt to remove tonsils and nodes both at one sitting. The question of precedence must be decided on the merits of each individual case.

CHARLES E. FARR.

DE PAOLI, E.: CLINICAL AND BACTERIOLOGICAL RESEARCHES ON MIKULICZ'S METHOD OF RENDERING THE PERITONEUM RESISTANT TO SURGICAL INFECTIONS. (*Boston Medical and Surgical Journal*, November 17, 1910, p. 759.)

The writer believes that Mikulicz's method of rendering the peritoneum resistant to surgical infections should be used in all cases, and because of his own experience with the drug he uses nucleinate of sodium without albumen prepared by Boehringer, of Mannheim, in doses of one-half to one gram dissolved in artificial serum sterilized by boiling. He finds that this drug has practically none of the disagreeable sequelæ of the drug manufactured by Miyath and Renner. The immunizing injection of nucleinate of sodium offers this advantage, in that it serves to measure with precision the natural powers of resistance of the patient who is about to be operated upon. If after the injection

there is a satisfactory hyperleukocytosis, this is the proof that the powers of resistance are sufficient; if, on the contrary, hyperleukocytosis does not follow injection of the drug we know that the means of defence against infection are decidedly lowered. Bacteriological studies of the blood of patients before and after the injection of this drug have shown an increase in the bactericidal powers of the blood serum with reference to cultures of certain organisms.

Fritz B. Talbot.

JACKSON, CHEVALIER: ESOPHAGEAL STENOSIS FOLLOWING THE SWALLOWING OF CAUSTIC ALKALIES. (*Journal of the American Medical Association*, November, 1910.)

Jackson reports 4 cases of this terrible affliction, seen during a single year. The cause is usually the swallowing of a solution of some form of "harmless cleansers" or "washing powders." The author urges that all such strong alkalies should be properly labelled and that the law should be as stringent with the manufacturer as with the druggist, especially as these commercial products are much more likely to fall into the hands of the ignorant. The result of such accidents is frequently death or a permanent stricture of the esophagus.

CHARLES E. FARR.

MEDICINE.

RACH, E., AND V. REUSS, A.: ICTERUS AND UROBILINURIA IN SCARLET FEVER. (*Jahr. für Kindhk.*, October 13, 1910, p. 422.)

While catarrhal icterus is very rare in scarlet fever, having been found in only 0.3 per cent. in 2,424 of the author's cases, an icteric tinge of the skin is almost always present, and may prove to be of considerable diagnostic value. It is absent only in mild cases with pale or fleeting rash. It is most marked during the height of the eruption. The icterus usually persists for a short time after the rash has completely faded. It disappears gradually, the exact time often being indeterminate. Urobilinuria is absent only in the mildest cases with faint eruption. While urobilinuria is present in the great majority of the cases its duration is very variable. In some cases it lasts but one or two days and disappears, while in others it may be present for one or two weeks. Its appearance may be sudden or gradual. In most of the cases, in addition to urobilin, its chromogen is present; in fresh urine the chromogen may be the predominating element. The author

could never demonstrate the presence of urobilin before the third day. Its quantity does not run parallel with the fever curve; nor is there always marked parallelism between urobilin and the icterus.

Urine containing a large quantity of urobilin is usually of a dark brown color, even when not of high specific gravity. The icterus and urobilinuria are both due to excessive destruction of red blood cells in the tissues and to insufficiency of the liver. Urobilin is a reduction product of bilirubin and is formed in the intestinal canal. That which is not excreted in the feces is absorbed in the circulation and brought to the liver, where it is reconverted into bilirubin. When excessive amounts are formed, e.g., when hemorrhages occur, or when the liver is insufficient, all of the urobilin is not converted into bilirubin. That part which is not converted is excreted by the kidneys and urobilinuria results.

S. FELDSSTEIN.

POSPISCHILL, D., AND T. WEISS: SCARLET FEVER. (*Jahrb. für Kindhk.*, October 13, 1910, p. 389.)

This paper is an abstract of a monograph by the authors which is based on a careful study of the disease at the Kaiser Franz Josef Regierung-Jubilaumkinderspitais of Wien.

The point of view is revolutionary and iconoclastic. Scarlet fever is a recurrent disease resembling recurrent fever in which there is an initial attack, which after an interval is followed by a second attack in which nephritis is only one of the symptoms. The nephritis is not a sequela, not a post scarlatinal phenomenon, but a manifestation of the scarlet which is still in full bloom. In the second attack, isolated symptoms may become manifest, or a complete relapse may occur. That renal involvement is a part of the first attack of scarlet is shown by the occurrence of hematuria as an initial symptom in some of the cases. The second attack may give evidence of its existence by the occurrence of fever, swelling of the lymph nodes, inflammation of the throat, pyemia nephritis and affection of the heart. The second attack may be followed by others, which may be complete or incomplete. These attacks may all be identical, or wholly dissimilar. The later attacks may recur for many weeks after the initial one.

As to therapy, exclusive milk diet is not recommended. Injection of streptococcus serum is futile. In uremia venesection is

strongly recommended. Mastoiditis is treated conservatively. Empyema is treated expectantly for some time and then thoracotomy is performed.

S. FELDSTEIN.

SERVADIO: EARLY DIAGNOSIS OF MEASLES.

Servadio does not consider the diminishing of bodily weight a sure diagnostic sign, neither a low leukocyte count. Conjunctivitis exists for him only in epidemics. Hypertrophic lingual papillae are found also in scarlet fever. Stomatitis and gingivitis are not constant. Bolognini in 1895 described as a new symptom the noise caused by peritoneal friction following exanthematic eruption on the peritoneum. Servadio found this last only three times in 133 cases observed, and Koplik's spots in 51 of the same number.

C. D. MARTINETTI.

HYGIENE.

RUSSELL, F. F.: THE PREVENTION AND TREATMENT OF TYPHOID FEVER WITH ANTITYPHOID VACCINE. (*Boston Medical and Surgical Journal*, Vol. CLXIV., p. 1.)

In the Spanish War 86 per cent. of the total deaths among Americans of the war was due to typhoid fever, and in the Franco-Prussian War 60 per cent. of the deaths among the Germans may be charged to the same cause. He believes that typhoid has invariably appeared among the armies of the past and may be expected in the future. The usual prophylactic measures are only partially available in camps. Vaccination is simple and harmless, and wherever used has reduced the incidence and mortality of typhoid. Antityphoid vaccination has long since passed the experimental stage.

FRITZ B. TALBOT.

RICHARDSON AND SPOONER: ANTITYPHOID INOCULATION AS INTRODUCED INTO CERTAIN TRAINING-SCHOOLS FOR NURSES IN MASSACHUSETTS. (*Boston Medical and Surgical Journal*, 1911, Vol. CLXIV., p. 8.)

The writers used an old stock culture which had been used in Widal reactions a number of years. The organisms were grown on Agar, suspended in salt solution, heated to 53°C. for one hour and counted with the use of a Zeiss blood platelet counter. Lysol, $\frac{1}{4}$ of 1 per cent., was added to prevent the growth of any accidental contaminating organisms. Four hundred and five in-

dividuals received 1,588 inoculations without any untoward results. The writers believe that the inoculated individuals have acquired an increased resistance to typhoid infection which will last them for several years at least. FRITZ B. TALBOT.

THERAPEUTICS.

LAURITZEN, MARIUS: THE MANAGEMENT OF DIABETES MELLITUS IN CHILDREN. ("Ueber die Behandlung des Diabetes Mellitus bei Kindern.") (*Die Therapie der Gegenwart*, July, 1910, p. 289.)

In Dr. Lauritzen's report of 27 cases of diabetes in children there is one at eight months, one at fourteen months, and one at two years of age. Ten of his cases are five years of age or less; and none of them are more than fifteen years old. He dwells upon the importance of an early diagnosis. A cure is possible only in those cases which are recognized at or near the time of onset, and even when death is the ultimate end of the condition the actual duration of life is greatly prolonged if the treatment has not been delayed. The presence of acetone, diacetic acid and Boxybutyric acids are elements tending toward a bad prognosis.

The treatment must depend upon dietary measures. The mere cutting down of the carbohydrates is not sufficient, and may in fact directly result in bringing on the dreaded acid intoxication. A properly balanced diet is one in which both the carbohydrates and albumins are restricted, the albumins to a lesser degree being the mother substance of the acids. The influence of the various albumins upon the glycosuria is marked. Milk and the meat albumins are apt to cause an increase in the glycosuria, while egg albumen and, in a lesser degree, the plant albumins have a more favorable action. It should also be mentioned that some of the carbohydrates are to preferred to others. Levulose and mannit are easily transposed, and seemingly work against the formation of acids, while milk-sugar is, as a rule, fairly well borne, yet there are cases which appear to have an outspoken intolerance for it. Maltose on the other hand is rarely if ever well borne by diabetics. Working on these principles a carbohydrate-albumin poor diet is used. In place of Naunyn's "hunger day" a vegetable day is substituted, and at rather frequent intervals an oatmeal day is inserted. During the oatmeal day no other carbohydrates are al-

lowed and no meat is given, but eggs, butter and cream are added to make up the necessary caloric values. When the acidosis becomes marked it is necessary to resort to the alkaline therapy. The vegetable acid alkalies and sodium bicarbonate are able to unite with the organic acids, saving the natural alkalies of the body and thereby making their elimination easier.

During the time of strict dieting absolute rest in bed is required, in order to reduce metabolic changes to the minimum.

Those cases which react favorably must be treated for a long time, and a careful supervision of the diet continued for at least two years after the glycosuria has ceased. From time to time these patients should enter a hospital in order to have their carbohydrate capacity tested. In this way the life of many diabetic children will be prolonged, and a few of them will be cured. Of Dr. Lauritzen's 27 cases 19 are at the present time dead, and 8 at the time of writing are living.

G. R. PISEK.

INFANT FEEDING.

CROSBY, J. H.: INFANT FEEDING. (*The Physician and Surgeon*, June, 1910, p. 229.)

Finkelstein has reduced the mortality in the large city orphanage of Berlin from 70 per cent. to 20 per cent. in five years. His researches have shown that "changes in the metabolism of the child produce changes in the infant's toleration for the elements of the food; that when these metabolic changes occur these food elements are productive of intoxication."

An equal quantity of cow's milk and woman's milk was treated with pepsin, thus separating the proteid and fat from the sugar, salts and water. By feeding to one set of children a mixture of the whey of woman's milk, and the curd of cow's milk, and to another set of children a mixture of the whey of cow's milk and the curd of woman's milk, Finkelstein was able to prove that the whey (the sugar, salts or water) of cow's milk would result in a loss of weight, while the children on the mixture containing the whey of woman's milk would gain. As the sugars of the two milks was practically the same the loss of weight must be ascribed to the salts. In addition to this it was shown that a child is able to stand almost any amount of casein.

Finkelstein divides nutritional disturbances into four groups: (1) Disturbance of balance. The weight is stationary. Stools

appear to be about normal. No temperature. There is an intolerance for fats. (2) Dyspepsia. The stools are more numerous, and greenish and slimy in character. There is loss of weight and the temperature rises to about 101. There is an intolerance for sugar. (3) Intoxication. Corresponds to our so-called gastro-enteritis, and is due to an intolerance for (a) sugar and (b) salts. Heat is the main cause of the reduced tolerance for sugar. (4) Decomposition or atrophy. Sugar plays an important part in these cases, and the condition often follows a third or fourth attack of intoxication. These cases are treated by feeding the child on the following mixture. The fat and albumen of a liter of full milk are precipitated with pepsin. To this is added a half liter of water and a half liter of buttermilk. "In Heubner's and Langstein's clinic they say the diet is effective inversely as the square of the distance from the Kinderasyll. The results are excellent in that hospital, fair in their hands, while Abt, of Chicago, reports that the results in his hands have not been very successful."

According to the author enough has already been accomplished with it to prove the correctness of Finkelstein's theory.

M. C. PEASE.

MALAGODI, A.: WOMAN'S MILK SECRETION. (*Bul. Sc. Med. di Bologna*, 1909, No. 12.)

The author has studied milk secretion in the obstetrical clinic of Bologna with a view to determine the manner in which fat is secreted with the milk. Contrary to the results obtained by Freund, he finds that fat increases during each nursing; the proportion of it is far larger at the end of the nursing than at the beginning. The same thing occurs whether the infant nurses vigorously or slowly. Malagodi thinks that unknown factors influence the secretion of fat, maybe on the part of the mammary gland itself.

Other results obtained by these researches have been: The quantity of fat is subject to daily variations, but always within the same limits. The percentage of fat is constantly lower in the morning and evening, while it rises about noon.

Wishing to know the percentage of fat in a woman's milk, the best way of obtaining tolerably accurate results is to get milk at the beginning and ending of each feeding during the day and making an average.

C. D. MARTINETTI.

BOOK REVIEWS.

THE PROPHEYLAXIS AND TREATMENT OF INTERNAL DISEASES. Designed for the Use of Practitioners and Advanced Students of Medicine. By F. FORCHHEIMER, M.D., Professor of Medicine, Medical College of Ohio; Physician to the Cincinnati and Good Samaritan Hospitals; Member of the Association of American Physicians; Member of the American Pediatric Society, etc. Second Edition. Pp. 712. New York and London: D. Appleton & Co., 1910.

The announcement of a second edition of Dr. Forchheimer's needs only the statement of the changes which have been made, no word of commendation being necessary for what has been rightly regarded as one of the few almost perfect medical works. The demand for the first edition was so great that several reprintings were made; but this edition is quite new, being entirely reset and revised in accordance with the ideas of to-day. A number of new chapters are on Dysentery, Rocky Mountain Fever, Tropical Splenomegaly, Tubercular Meningitis and Diseases of the Pancreas. It may be regarded, therefore, as the latest word on general therapeutics.

A TEXT BOOK OF GENERAL BACTERIOLOGY. By WILLIAM DODGE FROST, Associate Professor of Bacteriology in the University of Wisconsin, and EUGENE FRANKLIN McCAMPBELL, Professor of Bacteriology in the Ohio State University. Illustrated. Pp. 340. \$1.60 net. New York: The Macmillan Co., 1910.

While this is not a strictly medical book, it will be of value to medical men as a foundation to their bacteriologic training. The subject is divided into the morphology of bacteria, the methods used in the study of bacteria, the classification and relationships of bacteria, the general physiology, including the relationship of bacteria to environment and their metabolism, the biology of special groups of bacteria, and the distribution of bacteria, in soil, air, water, milk and the human body—a logical and comprehensive arrangement.

ARCHIVES OF PEDIATRICS

FEBRUARY, 1911.

ROYAL STORRS HAYNES, PH.B., M.D.,

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

THE PROBLEM OF THE FOUNDLING.

The pleasant-sounding statement of the Declaration of Independence that all men are created equal becomes a merry, or rather a sardonic, jest when one stops to think over some of the phases of the great question of infantile mortality and chances to compare the equality of the baby who is born into a well-to-do home and of the baby who is called a "foundling." For the one there have been months of waiting, during which care and solicitude for his proper development has made his mother rest, eat nourishing food, exercise, live a well-ordered, ruminative, happily anticipative existence, and he comes, longed-for, into a little universe of which he is the sun and whose whole ordering is devoted to his best possible care. He gets breast milk, or, if not

that, the best of artificial feeding, air, sunlight, quiet, coolness, cleanliness and individual attention. He may not thrive, it is true, for he may be congenitally defective, or may be injured at birth, or may die from one of the so-called preventable causes, but his chance of doing so is very small and everything that can be will be done to save and nurture him. Consider, then, the foundling, prior to whose conception even, it is likely that some taint has been prepared from dissipation or disease; think of the months of gestation in which there is the necessity of the mother's keeping at work, of hiding the change in her figure by too tight clothing, the probability of poor nourishment, the certainty of mental disquiet and anxiety. Then when the child is delivered, whether by a midwife or in an institution where there is perfect technique, what sort of chance has he? Sometimes, in how small a proportion the physician who has served in a large asylum knows only too well, the child may have a mother who gives up all friends and ties and faces social ostracism to nurse her child, to her credit and honor. But how many times is it urged that the only way to "save" the mother is to have her give up her child and go on in her old life with reputation preserved? How many times do the grandparents thus force a mother to indirect infanticide? or a physician or wet nurse agent entice a woman to sell her milk? How many times does a wicked woman thus easily rid herself of the results of her evil doing? The high percentages of deaths in foundling institutions show that abandonment usually happens.

Yet, were it not for these institutions which are willing to accept and to try to care for these deserted little ones, fewer would survive. As it is, the task is one of the greatest difficulty. The common plan is for some of the children to share with another child its mother's milk in the institution, while others are boarded out with wet nurses, who are becoming scarcer and scarcer; and still others are fed artificially inside or outside the institution. It is a case of the survival of the fittest alone, for those who are accepted by foster mothers for nursing are only those who look promising, and not those who need it most, so that the sickly have to be fed artificially. To do this in large numbers requires money, careful medical direction, and many attendants, any or all of which are usually lacking. Without all of these, successful artificial feeding in large numbers fails, and hence those wards where row upon row of babies lie, each day getting thinner and

quieter and colder, until they sleep for good—the marasmus babies, the nutritional failures of the institutional system.

What may happen to babies cared for solely in an institution Dr. Jacobi tells us,* when he says that he once found that of children who remained in an institution three months 100 per cent. died. It is not as bad as that nowadays, when boarding out babies in good homes has helped some, but it is bad enough, because there are not enough helpers to look after babies in institutions and the scattering of children over a wide area prevents adequate supervision. For a child needs more than the mechanical treatment of a ward. It needs a mother or mothering. It needs frequent tending and individual care, even when it is strong, with a good digestion, surroundings and inheritance. And much more does the sickly and feeble child need such watching. There are many women who are unmarried or childless who might do much good and gain for themselves a wonderful happiness by going frequently in the time they now spend on shopping, dress, bridge or the theatre, to tend or play with children in our large foundling institutions. They could supply in some little measure the mothering which those unfortunates lack and receive in return a reflex of the joy and satisfaction which only a mother knows. The good sisters realize the value of this personal attention, and often will save some child by devoting to it all their time as a mother would. But instances like this are few, and do little but point the way.

It is to this element of great watchfulness and personal care that the great success of the Speedwell Society† is due. It is not to the feeding, for that has been equalled elsewhere; nor to the superior homes, for similar homes have been available elsewhere; nor to the kind of children, for they are plainly as bad as can be. It is rather to the training of the foster mothers, to their constant work, to the stimulating visits of the nurse, and the wise and constant counsel of the medical director that such results have been accomplished. And the whole thing is so wonderfully simple, as most great things are.

This is an age in which the utilization of waste products has built up great fortunes. Here is a waste product—the marantic foundling—which our municipalities should utilize; and the experience of the Speedwell Society shows a method for so doing.

* Report of New York Academy of Medicine, Pediatric Section, p. 147.

† Dr. Glazebrook's article, p. 127, and Report of New York Academy of Medicine, Pediatric Section, p. 147, *et seq.*

ORIGINAL COMMUNICATIONS

GENERAL CONSIDERATIONS REGARDING THE EFFECTS OF VACCINES.*

BY S. McC. HAMILL, M.D.,
Philadelphia, Pa.

When an individual becomes the victim of a bacterial infection the protective powers of the body are immediately called into action. If these protective forces play their part effectually an indefinitely enduring immunity is eventually established.

Many theories have been advanced in explanation of this process. To this the comparatively recent discoveries of Wright and his co-workers have contributed not a little. They have shown that there is present in normal blood a fixed amount of a protective substance which they call opsonin, and which has as its function the preparation of bacteria for ingestion by leukocytes, which is specific in its action. Infected individuals have less of this specific opsonin than do normal persons, but by injecting a vaccine prepared from killed cultures of the infecting organism, the amount of opsonin may be increased, and by repeating such injections at properly timed intervals, it may be maintained at or above the normal level and, by thus rendering the blood rich in protective substances, hasten the establishment of immunity.

The method which Wright determined for measuring the opsonic power of the blood is as follows: Equal parts of washed corpuscles, an emulsion of the microorganisms and serum from the patient whose blood is being tested are mixed in a capillary pipette and incubated at 37° C. for fifteen minutes. From this mixture a film is prepared, and the number of organisms engulfed by, say fifty polymorphonuclear leukocytes, are then counted under the microscope and compared with unity—which is the number found in fifty polymorphonuclear leukocytes in a similarly prepared film made from a mixture of equal parts of the same washed corpuscles, the same emulsion of bacteria, and the serum of a normal individual. The resulting factor he terms the opsonic index. Immediately following the injection of killed organisms there occurs a fall in the opsonic content of the blood, the so-called negative phase. This fall is followed, after a period varying from a few hours to perhaps several days, by a rise in the index to or above

* Read before the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May 4, 1910.

the normal. Wright and many of his followers have insisted upon the frequent determination of the index as a guide to treatment, because they believe that the repetition of injections during the period of lowered index may prolong it, and by thus reducing the resistance of the patient contribute to the advance of the infection.

There has been much controversy over this particular point, those in opposition to Wright—who now compose the majority—holding that the danger of the occurrence of the so-called cumulative negative phase has been exaggerated, and that a careful study of clinical symptoms is quite sufficient indication for the timing of the dose. Without question, experience has demonstrated the correctness of this latter view—a very much to be desired result, as the elaborate and delicate technique involved in the establishment of the index would have interfered materially with the extensive application of a therapeutic measure which gives promise of valuable results.

The method of preparing the vaccines is comparatively simple. The organism to be used is grown in pure culture upon a satisfactory medium. This culture is then taken up in normal salt solution, which is shaken until it is evenly distributed, after which it is standardized so that each c.c. of the emulsion contains a known number of bacteria. It is then heated to 60° C. for thirty minutes to kill the bacteria, and 0.5 per cent. of carbolic acid is added as a preservative. The total number of bacteria per c.c. being known, the requisite number for the individual dose can be obtained by using a corresponding amount of the emulsion.

The application of vaccine therapy to the treatment of disease in children differs in no respect from its application to the treatment of disease in adults, save as to the dosage, and this, as in the administration of all other remedies, is based upon the age. The dose varies, however, for both adults and children according to the organism injected—thus the number of dead staphylococci that may be introduced into the body with perfect safety is many times greater than the number of dead streptococci. For the individual organism, also, the dose varies within rather wide limits. The majority of investigators advocate relatively small beginning doses, but they vary greatly in their opinions as to the maximum limit. The question is fortunately of no serious importance, as disturbing results have rarely followed the use of the larger doses.

The reports referring exclusively to the vaccine treatment of diseases in children are few in number. Children are included oc-

casionally in papers dealing with the treatment of both adults and children, but in these it is usually impossible to measure the effects of the treatment as applied to children because they have not been considered separately in the general result.

Of the gonococcal infections of early life, vulvovaginitis is by far the most common. The ophthalmias of the newborn are more serious, but unfortunately they do not offer a very promising field for vaccine therapy, on account of the acuteness of their course. No communications regarding the vaccine treatment of such cases have been noted, but there are a few, chiefly unfavorable, reports, regarding the treatment of gonorrheal infections of the eye in adult life. A few isolated cases of gonococcus infection of the joints in children have been treated by vaccines, but this treatment has been much more widely applied in adults.

Cole and Meakins, White and Eyre, Irons, Eyre and Hartwell collectively report 124 adult cases. They all report favorably upon the treatment and some of them are enthusiastic.

Alice Hamilton and Jean M. Cooke (*Journal of Infants' Diseases*, 1908, Vol. V., p. 158) were the first to apply bacterial vaccines to the treatment of *vulvovaginitis*. They studied the effect of gonococcal vaccines in the treatment of 67 cases, and their conclusions in part were as follows:—

"It is sometimes impossible to raise the opsonic index to the gonococcus by injections of dead gonococci, but when this occurs an improvement in the clinical condition usually follows.

"Acute cases inoculated with killed gonococci from strains which have been grown for several months on artificial media improve rather more rapidly than do control cases which receive no injections of killed gonococci.

"Better results are obtained by the use of strains which have been grown for a long period of time on artificial media than by the use of freshly isolated strains, and there appears to be no advantage in using the patient's own organism.

"While inoculation treatment does not produce a marked effect during the first weeks in acute cases, it seems to shorten the later stages; in chronic cases its effect is more evident than in acute.

"The substitution of inoculation therapy for local treatment in little girls presents some decided advantages, especially in chronic cases."

These conclusions are fully justified by the detailed results described in the body of the paper.

Butler and Long (*Journal of American Medical Association*, 1908, Vol. I., p. 744, and *Ibid.*, Vol. II., p. 1,301) have contributed two articles on this subject, in which they report 37 cases. In their first series they obtained more satisfactory results in the protracted cases from the vaccine made from four strains; but in their second series they concluded that such vaccine had no advantage over one prepared from a single strain. They believe that gonococcus vaccine is more effective than local treatment, and that in some cases it produces a very rapid improvement and often recovery, evidently using the term "recovery" in a relative sense.

Churchill and Soper (*Journal of American Medical Association*, 1908, Vol. II., p. 1,298) have published the results of the treatment of 41 cases, but 18 of which they were able to follow continuously. Of 9 cases which they could trace after treatment, 6 continued free from all evidence of the disease for periods ranging from three weeks to five and a half months. They used old cultures from one strain, and, like Hamilton and Cooke, believe them preferable to fresh strains. They conclude that the inoculation treatment seems to shorten the stay of patients in the hospital, but they did not determine that it actually lessened the total duration of the disease.

By far the most favorable results have been published recently by Hamilton (*Journal of American Medical Association*, 1910, Vol. I., p. 1,196), and for this reason his results are given in greater detail. He reports 344 cases of vulvovaginitis of gonococcal origin, 84 of which were given vaccine treatment. The author used three vaccines—one was prepared from a sixteen to eighteen-hour agar culture from acute urethritis in the male, prepared after Wright's method in the Rockefeller Institute, the strength of the emulsion being 100,000,000 to 1 c.c.—the second, a vaccine from stock culture of the same strength, prepared at the Presbyterian Hospital—and the third, a vaccine prepared by Parke, Davis & Co. No homologous vaccines were used. The smallest number of injections to produce a cure was four, and the greatest eighteen. He began treatment in all cases, except those under six months of age, with 50,000,000 every fifth day, increasing the dose by 10,000,000 until five injections were given; following this the intervals were ten days. In most of the acute cases, six injections were sufficient for a complete cure. The cure consisted of an absence of gonococci after four bacterial examinations of the secretion from the vagina, made at intervals of a week, followed by two examina-

tions at an interval of two weeks. Nineteen children returned to the clinic after a period of three months without evidence of the disease.

Of the 84 cases, 16 were of long standing. The more chronic the case the larger was the dose required. Of these 16 chronic cases which had been under irrigation treatment for long periods, 3 were not benefited, 1 did not return and 12 were cured. Those which did not respond to treatment with one of the vaccines frequently did well on the others. When no benefit was noticed, a new strain was used.

He obtained three cures by vaccines in children under one year of age, the youngest being three weeks old. Of the 260 cases treated without vaccines by irrigation, the average length of the treatment was ten months; while the average length of treatment in the 84 vaccine cases was 1.7 months. No local treatment was used in any of his vaccine cases.

It is extremely difficult to explain the difference in results reported in this paper and the ones which precede it. Whether or not the fact that Hamilton changed from one vaccine to another, when he found that his results were unsatisfactory with some particular strain, is sufficient to explain the discrepancy cannot be determined, because he does not indicate the frequency with which this procedure was resorted to. His cures were not only frequent, but generally permanent, and often after a comparatively short course of treatment. It is greatly to be desired that his results may be confirmed in the hands of other investigators.

Scarlet Fever.—The subject of the prevention of scarlet fever by injections of streptococcus vaccines seems to have been very widely studied in Russia and scarcely at all elsewhere. A very excellent review of this work has been published in the *Boston Medical and Surgical Journal* (1910, pp. 162, 242) for February of the present year, in an article by R. M. Smith, from which the following is largely quoted:—

This treatment had its origin some years prior to the studies of Wright and his school, and was inaugurated by Stickler, who, in 1883, injected into himself the blood of a scarlet fever patient. The result was a scarlatinal eruption on the third day, which was followed by desquamation. He later injected the desquamated scales into some altruistically inclined individuals, producing only a localized hyperemia, but apparently establishing an immunity, as

proven by failure to produce a recurrence of the symptoms by re-injecting these subjects at later periods.

The treatment was not considered again until 1905, when Gabritchewsky (*Russ. Vrach.*, 1905, p. 80, and *Ibid.*, 1906, pp. 10, 469) used a streptococcus vaccine prepared from bouillon cultures of a streptococcus isolated from a person ill with scarlet fever.

The reaction which follows this treatment is either an area of redness and inflammation around the site of the inoculation, which is somewhat painful and tender, or in from 10 per cent. to 15 per cent. a punctate erythema, very much like that of scarlet fever, but which is not followed by desquamation. The only reaction to the first injection is a slight elevation of temperature. The second injection may be followed by sore throat or swelling of the glands and a strawberry tongue, and in very rare instances the reaction may be sharp enough to produce albuminuria and prostration. Less often there is no reaction after the second injection and practically none after the third. A few cases give no reaction, especially those which have had scarlet fever. Only one fatal case in 50,000 injected had been recorded; this case having had a severe nephritis at the time of the injection.

Smith gives statistics from the articles of seventeen Russian writers, covering 4,672 individuals, 40 of whom later developed the disease. Of this number, 127 were inoculated by Gabritchewsky. Of his cases, 5 developed the disease, 4 of these after the first treatment. Of 90 children not vaccinated and living in the same district, subject to the same conditions, 36 developed scarlet fever.

In the experience of all the writers, a vast majority of the cases occurring after vaccination developed the disease before the second vaccination could be given. The results seem quite remarkable, but the method has probably failed of popularity outside of Russia, because of the severity of the symptoms of reaction.

Vladimiroff (*Arch. f. Kinderheilk.*, 1909, Vol. LII., H. 3, p. 28) gives a brief review of the Russian literature relating to this subject and states that 50,000 vaccinations had been made, and that the procedure is harmless. He reports 1 case of his own, in which he thought immunity had been established.

There are a few scattered reports of the treatment of isolated cases of scarlet fever by bacterial vaccines, which have been in the main unsatisfactory, but there have been some apparently favorable results in the treatment of the complicating ear and

glandular suppurations by vaccines prepared from streptococci isolated from cases of scarlet fever.

The majority of investigators have considered the acute generalized infections as not well adapted to treatment by bacterial vaccines. Nevertheless, one finds very brilliant results reported in the treatment of such cases.

It is very difficult to interpret the results of treatment in any acute self-limited disease, and there is probably none of which this may be stated more truly than *pneumonia*, especially the lobar pneumonias of early life.

There have been comparatively few studies of the effect of vaccine treatment upon pneumonias in children. In a paper by Hoobler, to be referred to later, 1 case was included, and one finds children included here and there in general reports upon pneumonia. Thus Wilcox and Morgan (*British Medical Journal*, 1909, Vol. II., p. 1,050) treated 24 cases of lobar and primary bronchopneumonia due to the pneumococcus, using autogenous vaccines in all cases. Fourteen of their 24 cases were children ranging in age from two and one-half to fourteen years. Twenty-two of the 24 cases treated recovered. They thought the duration of the disease was shortened in some cases. The most striking effects, however, were shown in the cases which had been running protracted courses, and in these they considered the vaccines responsible for the cure.

Harris (*British Medical Journal*, 1909, Vol. I., p. 1,580) includes two children in reporting a series of 11 cases. One of these had an unresolved pneumonia of some weeks' duration and the other a complicating empyema and nephritis. In the latter cases the vaccines had a remarkable effect upon the complications, and both cases recovered.

Wolf (*Journal of Infants' Diseases*, 1906, Vol. III., p. 731) concludes from the treatment of 14 adult cases that the vaccine treatment of patients with lobar pneumonia seems to exert a favorable influence upon the course of the disease and to hasten the crisis.

Leary (*Boston Medical and Surgical Journal*, November 11, 1909) noted rapid relief of toxic symptoms, especially the quick cessation of delirium. He treated 83 cases, with a mortality of 9.7 per cent., and 15 of these cases had crises within three days.

The most striking feature in these reports seems to be the early crisis in the cases which recovered. Practically all of the authors

had distinctly lower mortalities in the vaccine-treated cases than occurred in the others they were observing in the same seasonal periods, and their cases were not supposed to have been selected.

Staphylococcus Infections.—Treatment by staphylococcus vaccines, especially in such localized infections as furunculosis, carbuncles, abscesses and acne, has been very effective. Indeed, all forms of infection due to the staphylococcus pyogenes aureus seem to offer a promising field for treatment by vaccines. A few groups of cases of furunculosis in children have been reported, and one finds scattered cases of other forms of staphylococcic infection in early life which have responded satisfactorily to vaccines.

Thus several instances of Ludwig's angina (Wright, Walters, Coombe and Solly) have been successfully treated, and Mallanah (*British Medical Journal*, 1909, No. 2, p. 984) reports a very interesting case of cancrum oris, which was failing rapidly, in spite of local treatment, and which was thought to have been in a hopeless condition when vaccine treatment was begun. Three injections at intervals of three days resulted in complete cure at the end of two weeks.

Wechsel and Michaelis (*Deutsch. Med. Woch.*, July 29, 1909) treated 13 children with staphylococcic abscesses with very satisfactory results. Other forms of treatment had been tried without effect. Two of their cases were infants, aged four months. In addition to having abscesses, they were both syphilitic and in a wretched state of nutrition. The treatment not only cured their abscesses, but improved their nutrition in a striking manner—a result which has been noted by other observers.

There are many infections in which the staphylococcus acts as a secondary factor, and in these the addition of a staphylococcus vaccine to the treatment will frequently result in a prompt disappearance of disturbing symptoms.

Autogenous vaccines do not seem as essential in the treatment of infections with the staphylococcus as in infections with some other organisms, but they are always preferable, and there are a good many instances on record in which improvement has followed the use of vaccines made from the patient's organism after stock vaccines had failed.

Treatment by *streptococcus* vaccines has been unsatisfactory. The results with stock vaccines have been especially bad. The great variety of different strains of the streptococcus, the presence of several strains in the same infection—some virulent and

some avirulent—have not only made treatment by stock vaccines unsatisfactory, but have also rendered uncertain the results from autogenous vaccines. They have been used almost entirely in adults.

Colon infections of the urinary tract are being treated very extensively by colon vaccines at the present time; much more, in fact, than the contributions to the literature would indicate. Their use has been restricted almost exclusively to adults. They seem to give very prompt relief to the symptoms, but to have no effect upon the disappearance of the organisms from the urine.

Otitis Medica.—Vaccines have been used to some extent in infections of the middle ear. Tunicliffe obtained benefit in some cases which were due to the pseudo-diphtheria bacillus, the cases having occurred subsequent to attacks of scarlet fever.

A case of infection with the bacillus pyocyaneus of more than two years' standing reported by Mallanah (*British Medical Journal*, 1909, No. 2, p. 934) was completely cured by six injections of an homologous vaccine. Every other form of treatment had been tried without success.

Trimble (*Journal Kansas Medical Society*, 1909) reports 4 cases; the organisms being respectively the staphylococcus aureus in 2 cases; the bacillus pyocyaneus in 1; and the bacillus pyocyaneus with the staphylococcus albus in 1. In the last case he used a mixed vaccine, and recovery ensued in all. He advises that in all cases of chronic otitis media in which the symptoms are scarcely sufficient to justify operative procedures, vaccine treatment should be employed.

A very interesting paper recently published by Hoobler (*ARCHIVES OF PEDIATRICS*, Vol. XXVI., p. 674, 1909) reports a series of 8 cases, including one each of the following conditions:—chronic bronchitis, following whooping cough, complicated by acute purulent otitis media due to the staphylococcus aureus; bronchopneumonia with delayed resolution due to a mixed infection with the staphylococcus aureus and a streptococcus; a general rheumatic infection, due to the staphylococcus aureus; a septic infection after operation for double mastoid disease due to the staphylococcus aureus; a streptococcic empyema following pneumonia, a streptococcic septicemia following acute purulent otitis media; a staphylococcus furunculosis; and a streptococcus furunculosis following infection from hypodermic injections. Practically all of these cases were treated by autogenous vaccines and

the mixed infections by mixed vaccines. Recovery ensued in all, and in several the cures were unusually rapid. Hoobler was of the opinion that the recovery in the cases of general rheumatic infection and streptococcic septicemia could be justly attributed to the vaccines, and that measured from the standard employed in judging of the efficiency of drugs, the vaccine showed a favorable influence in all the cases.

Floyd and Worthing (*Boston Medical and Surgical Journal*, 1908, No. 5, p. 158), in a general paper, report 9 cases in children, including 2 of empyema, 1 each of osteomyelitis, abscess of staphylococcus origin, generalized furunculosis, slowly resolving pneumonia complicated by empyema, pyelitis due to the bacillus Escherich, of the colon group, pyelitis due to another variety of the colon group, and an abscess of the right thigh due to the pneumococcus. The case of osteomyelitis, which terminated fatally, was a systemic infection with the staphylococcus aureus. The two empyema cases were pneumococcic infections and both responded promptly to drainage and injections with stock vaccines. All of the remaining cases ended favorably.

White and Eyre (*Lancet*, 1909, No. 1, p. 1,586) include in a report of a number of adult cases, one of a boy aged twelve years with ulcerative colitis. The condition had persisted for four years. Injections with vaccines prepared from a bacillus of the colon group isolated from the feces and given in doses of from 5,000,000 to 50,000,000 at intervals of one week resulted in a complete cure at the end of three months.

Tuberculosis.—The opinions regarding the dose of tuberculin for the treatment of tuberculosis in early life are largely in favor of the smaller doses. For children under one year the dose has varied, almost without exception, from 1/12,000 to 1/8,000 mgs., and for children from one to twelve years of age from 1/4,000 to 1/1,000 mgs. On the other hand, Schlossman (*Deutsch. med. Woch.*, February 18, 1909, p. 289) strongly advocates, what would seem in the light of more recent discoveries, the use of remarkably high doses. He says, regarding the dosage, that:—

(1) It should be so gauged as to produce as little harm as possible.

(2) It should be as large as possible, provided no harm is done the patient.

In relation to this second statement, he points out that once toleration has been established for a small dose the body of the

tuberculous subject is much more readily rendered immune to large doses. He, therefore, begins his treatment with relatively small doses; for instance, in 2 infants, whose cases are described in detail, he begins the treatment in one with $1/100$ of a mg., and in the other, aged eighteen months, with $1/10$ of a mg. In support of the larger doses, he states that tuberculous antibodies are not produced in the child until doses of about $1/10$ gm. have been reached, and that the quantity of antibodies formed increases parallel with, or in proportion to, the quantity of tuberculin injected. So long as the antibody content is maintained, further injection of tuberculin is not followed by reaction, hence the antibody content in the serum is of some value as an indication for pursuing or interrupting the injections. The index should be maintained at a certain height throughout the treatment.

In the light of his belief that antibodies cannot be demonstrated until a dose of about $1/10$ gm. has been reached, he aims to bring these patients to the point of tolerating doses of decigrams and grams, since this assures the antibody formation a phenomenon which is associated closely with the process of recovery.

He divides the tuberculin treatment into two stages:—

(1) That in which the organism must be brought to a point of tolerating the amount of tuberculin necessary for the production of antibodies.

(2) The maintenance of antibody formation by the use of sufficiently large quantities of tuberculin at suitable intervals.

For children on prolonged treatment he gives tuberculin in doses of from .5 to 2 gms. repeated from every five to eight days. He insists upon it that immunity to tuberculosis must not at any time be allowed to diminish, so that the patient cannot tolerate .1 gm. practically without reaction.

Schlossman acknowledges that bad effects occasionally occur, and the most important one is the failure of a reactive temperature to return to normal. In these cases the infant sometimes succumbs and miliary tuberculosis is found at the autopsy. He believes, however, that such accidents can be avoided. Children liable to such occurrences always show a great tendency to irregularity of temperature even before the injection.

He points out that cases of this character are practically certain to succumb to the disease anyhow, and he thinks that these cases should be treated, but that the utmost care should be taken

to use small initial doses. Once the organism has become accustomed to the minute initial dose and the resisting forces called out by the injection of large doses, the danger of miliary tuberculosis may be set aside. As a further support of the larger doses, Schlossman contributes some rather striking results. For instance, he reports the case of an infant in whom treatment was begun at the age of nine months for tuberculosis of the bronchial glands and lungs. The child was living and in good health at the age of one and three-quarter years. In this case the child reacted twenty-eight times in the course of sixty days on a dosage of $1/10$ of a mg., finally the organism became habituated to this dose of tuberculin and no reaction occurred thereafter.

Eight other tuberculous infants systematically treated with tuberculin survived the first year of life. On the other hand, 4 not treated with tuberculin died.

Regarding the prognosis of tuberculosis in infants, he makes the following statement: "I regard it in the main as very unfavorable, but if a child is suitably fed and scientifically treated with tuberculin, the prognosis may be regarded as favorable in the sense that such infants, if they are in good condition, may be carried through the difficult period of infancy." He does not intend to imply that a complete cure is established, but he does believe that healing to some degree takes place in the glands or in the lung tissue, thus preventing miliary diffusion, which is the common termination of untreated cases.

Engel (Brauer's *Beitr. z. Kl., d. Tub.*, 1909, No. 13, p. 245), in reporting upon the use of tuberculin in the treatment of tuberculosis in children, follows very much the same line of dosage as that administered by Schlossman, except that his beginning doses were smaller. He gradually increases the amount of tuberculin to the point at which a febrile reaction occurs. He then continues this dose until no febrile reaction takes place, and then again advances the dose to the point of tolerance until as much as 2 mgs. are given. He does not fear febrile reactions, but believes that within limited degrees they are advantageous.

In the treatment of children suffering from benign forms, which he defines as the glandular and osseous, he considers it perfectly safe to give 1 mg. as the initial dose. With two or three such doses he is usually able to establish immunity.

In pulmonary tuberculosis, in which the lesion is not severe, one can usually begin with $1/10$ gm., but in the severe cases

the beginning doses should be from 1/100 to 1/1,000 mgs. He states that in determining the maximum dose he found it very useful to determine the antibody in the serum. He considers the most important thing in treatment as follows: (1) To establish a high degree of immunity, and (2) to maintain it for as long a period as possible.

The antibodies of the serum may be determined as an indication of the degree of the immunity; but he believes that the body temperature may be safely adopted as the sole guide in treatment.

The intervals between the doses should not be more than four or five days. This interval is chosen because it approximately measures the duration of the complete immunity. The time required for producing immunity to large doses of tuberculin is from two to three months.

In endeavoring to reach some conclusion as to the results of tuberculin treatment, he states that only years of observation will enable one to determine definitely that a cure has been effected. He has been enabled, in many instances, to clearly demonstrate a lessening of the anatomic lesion, but at the autopsy in some fatal cases he observed an extensive fibrous formation in the cadavers of children with tuberculin at an age when there is no spontaneous tendency to anatomic methods of healing. These manifestations he accredited to the tuberculin. He points out that it has already been demonstrated by pediatricists that an infant which has been infected with tuberculosis cannot survive longer than a year. He refers to eight instances, between the ages of three and eight months, having various forms of tuberculosis, chiefly glandular, none of them occult, which have successfully passed through the period of early infancy.

He concludes that tuberculin exercises a favorable influence upon the disease, and that it may be positively asserted that it tends to impede the progress of the disease, and that it can be given without in any way injuring the child's development.

Apropos of the method of healing as defined by Engel, it may not be amiss to here refer to the statement of Ochsner (*Southern Medical Journal*, 1909, No. 2, p. 445) regarding the vaccine treatment of joint tuberculosis that "vaccine treatment, added to his former routine method, has resulted in recovery with greater mobility of the joints." He explains this as being due to a vascularization of the part—a tearing down of the connective tissue wall, thus giving the phagocytes an opportunity to destroy

the tubercle bacilli, a process which is quite contrary to the old accepted theory of cell proliferation, connective tissue formation, constriction and elimination of blood vessels resulting in fatty degeneration, necrosis, and finally calcareous deposits.

He reached this conclusion in the following manner: In treating some cases of tuberculous cervical adenitis, he operated upon one side of the neck, and then began the administration of vaccines. Some time later he operated upon the other side. At the first operation the glands had their ordinary gland capsule, and, in addition, a very considerable deposit of periglandular connective tissue. At the second operation, on the opposite side, the gland capsule was about the same, but the periglandular connective tissue had almost entirely disappeared, and the surrounding tissues were much more rich in blood vessels. Both these views—that of Engel and that of Ochsner—are based upon pathologic evidence, but are diametrically opposed. The older pathology corroborates the view of Engel, whilst the theoretical viewpoint of the vaccine therapist based upon his clinical experiences, suggests that in lesions of any sort, and especially tuberculous lesions, walled off by fibrous tissue, satisfactory results from bacterial vaccines cannot be obtained until in some manner the vascularity of the localized lesion is increased.

To turn from favorable results of treatment with these relatively large doses to a consideration of treatment by doses varying from 1/10,000 to 1/1,000 mgs., which also show favorable results, rather confuses one's judgment as to the proper method of treatment to follow. The advocates of the smaller doses are very definite in their statements regarding the danger of larger doses. Thus Dingwall Fordyce (*Lancet*, 1909, No. 2, p. 1,745), in reporting upon the treatment of 100 children, lays great stress upon the danger of large doses, or the use of tuberculin at all in cases where the temperature is unsteady. His results in the treatment with tuberculin, however, have been in no sense as satisfactory as Schlossman's; and he is rather inclined to believe that treatment by rest, climate, feeding and careful nursing yields as good results as tuberculin treatment. If these measures cannot be adopted he thinks that tuberculin can be used to great advantage.

Reviere (*British Medical Journal*, 1907, No. 1, p. 859) reports very excellent results by treatment with doses varying from 1/12,000 to 1/3,000 mgs. This report consists of 16 cases ranging in age from one to twelve years, and including cases of

dactylitis, superficial abscess, tuberculous glands, psoas abscess, tuberculous joint disease, abdominal tuberculosis and phthisis. He lays great stress upon the point that his results have been more satisfactory with small doses at short intervals than with larger doses at longer intervals.

Carmalt-Jones (*British Medical Journal*, 1908, Vol. II., p. 581) reports a series of 367 out-patient cases treated with tuberculin in St. Mary's Hospital. Of this number, 155 involved lymphatic glands; 87 of these he was able to follow after treatment; in 8 of this group the injection had been employed as an adjunct to removal by operation. All were cured. Of the remaining 79, 27 were cured, 22 much improved, 18 improved, 8 unchanged and 4 worse. Twenty-four of the cases were in children under ten years of age. His results were best in this group, and increasingly worse with advancing age, except for the ten years following puberty. In the children treated, he gave as the maximum dose for those under five years of age 1/10,000 mgs. and for the older children 1/4,000. Whilst he obtained fairly favorable results in the many other tuberculous conditions treated, his most favorable ones were in lymphatic tuberculosis.

Carmalt-Jones's experience has been the common one of those who have used tuberculin extensively in the treatment of tuberculosis. Favorable results have been obtained by various authors in the treatment of ulcers, sinuses, abscesses, lupus, dactylitis, bone disease, ocular tuberculosis, peritonitis, tuberculosis of the genitourinary tract and pulmonary tuberculosis.

Strikingly good results were obtained by Smith (*British Medical Journal*, 1909, Vol. II., p. 1,046) in the treatment of tuberculosis arthritis. In this group there were 17 children of thirteen years and under, and of this number, 11 were cured, 4 improved and 1 unimproved. Both he and Reviere lay great stress upon the importance of treating associated infections which they found in several instances to be due to the staphylococcus. Such cases frequently recover promptly when the treatment of the added infection is begun.

In summing up, it may be repeated that the results from the vaccine treatment are much more satisfactory in early life than in later life, and localized tuberculous lesions, especially the glandular types of tuberculosis, are much more favorably affected than the pulmonary type, especially those with generalized symptoms.

There is a long list of additional infections, such as erysipelas, diphtheria, cerebrospinal meningitis, pertussis, dysentery, infective endocarditis, pyorrhea alveolaris, actinomycosis, infection of the sinuses and various infections of the skin which have been treated by vaccines, but the number of cases included in these reports have been so few or the results so indefinite that it has seemed unnecessary to do more than refer to them. The results in diphtheria and cerebrospinal meningitis have been so inferior to the results from serum treatment that the use of vaccines in these conditions seems scarcely justifiable.

The impressions which one gathers from a thorough study of the literature of vaccine therapy as it relates to both adults and children are that it has been clearly demonstrated that localized infections with the staphylococcus pyogenes aureus are quickly cured, especially when autogenous vaccines are used, that generalized infections with this organism are favorably influenced, that gonococcal joint infections, which are relatively rare in children, are usually benefited, and as to other forms of infection that there are not enough data at hand to justify one in drawing conclusions as to the value of bacterial vaccines in their treatment.

It is true that in individual and even in small groups of cases, striking results are reported which seem attributable to the vaccine treatment, but one must not forget in measuring the value of any treatment that striking recoveries sometimes occur in seemingly hopeless cases, irrespective of the nature of the treatment.

A STUDY OF SPINAL ANESTHESIA IN CHILDREN AND INFANTS.—H. T. Gray (*The Lancet*, October 2, 1909) presents his results and conclusions from the use of spinal anesthesia in 200 children. Surgical shock is done away with, thus allowing a far wider range of operation. Anesthesia can be strictly localized to a part of the body, *i.e.*, the abdomen can be anesthetized with the thorax not so, thus avoiding pneumonia. To the surgeon this method has great advantages in that he need not consider the depth of anesthesia nor dangers from ether or chloroform; in addition, there is perfect relaxation. With one exception, he has lost no case of intussusception under this method of anesthesia. Vomiting is done away with and pain is greatly lessened. Children can be given food from the start.—*Boston Medical and Surgical Journal*.

AN EXPERIMENTAL STUDY ON THE FOOD REACTIONS IN THE INFANT'S STOMACH COMPARED WITH THOSE IN VITRO.* †

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Because of the many discordant views concerning the digestive processes in the infant's alimentary canal which have grown out of purely empirical observations and the comparatively small number of direct investigations upon the infant's stomach, we became interested in finding out for ourselves with the material at hand how the food reactions in the stomach compare with those *in vitro*. In order for an investigation of this sort to be of any practical value it became necessary for us to determine, first, the stimulating effect of food fed to normal infants on the activities of the stomach; second, how these functions are altered by the use of certain chemical substances and how the reactions of these compare with changes obtainable in the test tube with artificial gastric juice.

We have determined (1) that the infant's stomach is capable of stimulation from the first day of life; (2) that unquestionably acid and the ferments are all secreted at this time. Briefly stated, we have obtained rennet curds, an increase in the acidity of breast and modified milk after it has remained in the stomach a certain time and which, by means of Sjöqvist's test is proven to be combined hydrochloric acid, and we have obtained digestion of egg albumen in stomach juice rendered acid to Günzberg's reagent and dimethyl amido azo benzole.

The Secretion of Acid.—As soon as food enters the infant's stomach acid begins to be poured out. If, after a feeding, small

* From the Pediatric Clinic of the University of Michigan Hospital.

† Read before the Twenty-first Annual Meeting of the American Pediatric Society, Washington, D. C., May 4, 1910.

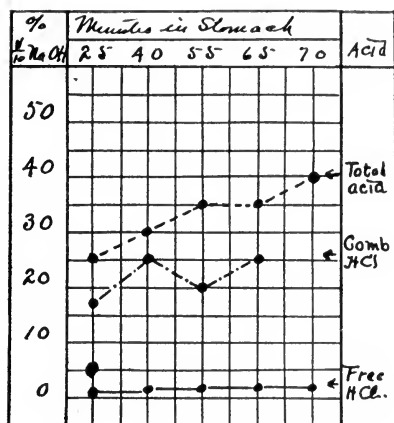


Chart 1. A Normal Acidity Curve.

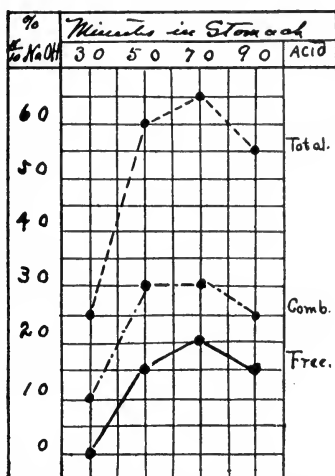


Chart 2. An Abnormal Acidity Curve, Hyperchlorhydria.

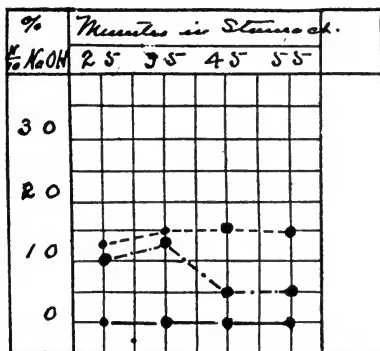


Chart 3. A Normal Acidity Curve.

quantities of stomach fluid are removed from the stomach by means of a soft rubber tube it will be seen that the acidity gradually rises toward a point which may be called the height of digestion and then gradually falls (Charts 1, 2, 3), simulating to a certain extent exactly what takes place in the adult stomach. The secretion of acid in the infant's stomach differs only in degree, for it may be said to be the rule that all the acid combines with the proteid and does not appear in the free state. Only comparatively rarely do we find a case showing free acid, and in this respect our experience is in exact accord with that of Clark and others. Our cases for the greater part varied between the ages of one day and two months; Clark's from two months to eight months. Some of our cases were nine, ten, eleven, twelve and thirteen months old.

Incidence.—In 14 breast-fed infants (Table 1) free acid was detected in 1 (21 analyses). The total acid varied between 10 and 50. In 28 hand-fed infants free acid was detected in 5 (87 analyses) (Table 1). The total acid varied between 3 and 65. In cases showing free acid the amount varied from a trace to 25. In the breast-

TABLE 1.

No.	Case	Age		Formula						Motor Tests				Curds		Mucus	Acids			Date			
		M.	D.	F.	S.	P.	Sodium Citrate, grs.	Water, %	Whey	*	Time in Stomach	Amount Taken, c.c.	Amount covered, c.c.	Lavage	+		%	Character	Free HCl		Comb. HCl	Total Acid	
1	Snyder, Bill	6	8	2	6	1	1	+	+		2 hrs.	120	75	Few fine curds			Fine, granular, soft	+	0	16	18	9- 2-09	
2	"		12	2	6	1	1	+	+		2 "	150	45	" "			" "	+	+	8	10	9- 6-09	
3	"		14	2	6	1	2	+	+		2 "	150	0	Few floccules				+	+	-	-	9- 8-09	
4	"		21	2	6	1	2	+	+	Ster.	2 "	165	15				Many small floccules	+	0	10	10	9-15-09	
5	"		23	2	6	1	50	+	+		2 "	120	0	Small amount mucus				+	+	0	+	9-17-09	
6	Knickerbocker, E.	23	4	53	5						2 "	270	0	Few small curds; much mucus				+	+	0	-	9- 2-09	
7	"		4	53	5						2 "	270	0	Large curds; much mucus				+	+	0	2	3	9- 6-09
8	"		4	53	5						2 "	270	0	Small amount mucus and curds				+	thin	0	-	7	9- 9-09
9	"		4	53	5						1:20	270	0	Few small curds; much mucus				+	+	0	-	-	9-13-09
10	"		4	53	5						45 m.	195	0	Few curds; small amount mucus				+	thin	-	-	-	9-14-09
11	Rebolt, Olive	11	10	3	6	1				R W	2 hrs.	240	0	Small amount mucus; few fine curds				+	+	-	-	-	9- 3-09
12	"		3	6	1					"	2 "	270	0	Few large curds				+	+	0	+	+	9-21-09
13	"		3	6	1		40			"	2 "	270	90	Milky material		33	In washings		4	10	14	9-22-09	
14	"		3	6	1					"	1 "	270	52	Clear		23	Not noted	+	thin	0	19	20	9-24-09
15	"		3	6	1					"	1 "	270	80	Much curds; mucus		30	Large, free from whey	+	+	0	20	20	9-28-09
16	"		3	6	1		33%			"	1 "	270	58	Few curds			Flocculent curds	+	+	0	4	4	9-29-09
17	"		3	6	1		33			"	1 "	240	50	Sour curds			Thick, soft curd	+	thin	0	9	10	9-30-09
18	"		3	6	1		18			"	1 "	270	125	Few curds			Few small, free from whey	+	+	0	9	9	10- 5-09
19	Holtcamp, Boy	5	2	5	6	1		+		Gav.	2 "	150	40	12 c.c. curds			Medium, soft curds	+	+	0	10	12	9-29-09
20	"		2	5	6	1		+		"	2 "	150	34	Few curds			Small curds, mostly whey	+	+	0	20	20	9-30-09
21	"		2	5	6	1		+		"	2 "	150	45	6 c.c. curds			Few small curds, soft	+	thin	0	18	18	10- 1-09
22	"		2	5	6	1	Peptid	+		"	2 "	150	100				Much soft, viscid casein, mostly whey; no distinct curd	+	+	0	-	20	10- 4-09
23	"		2	5	6	1		+		"	2 "	150	50	4 small curds			Few fine curds and whey	+	+	0	18	18	10- 5-09

* Abbreviations: Ster.—sterilized. Past.—pasteurized. R W—rice water. Gav.—food given by gavage. Peptzd—peptonized.

† Percentage of curd recovered estimated by centrifugalization in graduated tube. § See Chart 4.

[illegible]

No.	Case	Age		Formula						Motor Tests			Curds		Mucus		Acids			Date
		M.	D.	F.	S.	P.	Sodium Chloride, grs	Lime Water, %	Whey	*	Time in Stomach	Amount Taken, c.c.	% Covered, c.c.	Lavage	%	Character	Free HCl	Comb. HCl	Total Acid	
54	Wilder, Baby	16	2.5	6	1						1 hr.	75 Samp.			20	Medium sized	0	—	35	2-28-10
55	Rodda	16		Breast							1 "	"	"		22	Granular	0	—	35	2-28-10
56	Scofield	1	12	3	6	1					1 "	105	"	Clear	14	Medium; clear whey	0	—	20	2-28-10
57	Grimes	6		Breast							1 "	"	"		12	Fine, granular	0	—	55	2-28-10
58	LaPort	17	2.5	6	1						1 "	45	"		15	Thick, blocking tube; clear whey	10	—	60	2-28-10
59	Youngs	8		2.5	6	1					1 "	45	"		12	Medium and large, blocking	0	—	40	2-28-10
60	Clark	18	2.5	6	1						1 "	45	"		40	Large and soft	0	—	45	2-28-10
61	Kirela	12		Breast							1 "	?	"		25	Fine, soft	0	—	35	2-28-10
62	Young, Leon	7	3	3	6	1					3 hrs.	120	22	Practically clear		Fine, soft; clear whey	15	20	50	2-3-10
63	"	7	3	3	6	1					1 hr.	90 8 c.c. Samp.			30	Fine, soft, floating in whey	25	30	65	2-3-10
64	"	7	4	3	6	1					6 hrs.	120	1		0	No curds	0	0	0	2-4-10
65	"	7	4	3	6	1	4	5			1 1/2	90 Samp.			8	Granular	25	20	65	2-4-10
66	LaPort	18	2.5	6	1						1 1/2	45 Samp.	7		25	Small, soft	++	—	50	3-1-10
67	"	25	2.5	6	3/4			54			—50	90 Samp.	3		30	Medium sized	++	—	15	3-8-10
68	Clark, Raymond	26	2.5	6	1.5				+		—48	90 Samp.	9		15	Very fine; whey milky	0	—	18	3-8-10
69	Young, Ronald	26	2.5	6	3/4			54			—55	90 Samp.	10		40	Medium size	0	—	12	3-8-10
70	Wilder, Elmer	25	2.5	6	3/4						45	90 Samp.	11		25	Small and medium	0	—	15	3-8-10
71	Young, Ronald	27	2.5	6	3/4	3					1-1/4	90	9	Little mucus	30	Very fine, granular	0	—	15	3-9-10
72	Wilder, Elmer	26	2.5	6	3/4	3					1-1/4	90	4		40	" "	0	—	30	3-9-10
73	Clark, Raymond	27	2	6	6	1.6	3				1-1/4	90	4		20	Very fine, milky, well mixed with whey	0	—	30	3-10-10
74	Wilder, Elmer	27		Beef broth							1	90	7	Clear		"	0	—	30	3-10-10
75	Young, Ronald	28		"	"						1	90	11	"		"	0	—	30	3-10-10
76	Clark, Raymond	18		"	"						1	90	13	"		"	0	—	26	3-10-10
77	LaPort	28		"	"						1	60	2	"		++ thick	0	—	35	3-10-10

§ No effort made to empty stomach.

78	Young, Ronald	35 2.5	6 3/4	1	Past.	1 1/4	Na ₂ CO ₃	90	13	Clear	35	Fine, granular, soft	++ very thick	0	18	3-17-10
79	Clark, Ray	35 1	6 1/2		Na ₂ CO ₃	1 1/4	75	75	11		30	Small; milky material; no whey	++ ++	0	20	3-17-10
80	LaPort	35 2.5	6 3/4	1	1 1/4	1 1/4	75	75	14		5	Very fine, granular; no whey	++ thin	0	12	3-17-10
81	Wilder, Elmer	34 2.5	6 3/4	1	1 1/4	1 1/4	90	90	11.5		40	Fine, granular; clear whey	++ thick	0	30	3-17-10
82	Kolbfeisch	9 ? ? ?	?	?	1 1/2 hr.	1 1/2 hr.	?	?	9		20	Medium and small; whey	++ thick	0	30	?
83	LaPort	41 2.5	6 3/4		60	60	75	75	15		35	Small, soft; not free from whey	++ ++	0	16	3-24-10
84	Wilder, Elmer	41 3	6 1/2		63	63	9	9	17		40	Very fine, like thick milk; no whey	++ quite thick	0	9	3-24-10
85	Rodda	40 2.5	6 3/4	3	65	65	75	75	13		10	Medium and small; whey clear	++ + thick	0	20	3-24-10
86	Grimes	30 1.5	6 1/2		60	60	75	75	15		22	Medium and fine; whey milky	++ thin	0	16	3-24-10
87	Bentley	10	Breast		60	60	?	?	16		39	" " small; "	++ ++	0	18	3-25-10
88	Weston	7	"		62	62	?	?	14		28	Small; whey clear	++	0	34	3-25-10
89	Russell	10	"		64	64	14	14	14		2	Medium and small; whey milky	++ + thick	0	40	3-31-10
90	Reed	55	Skim milk	I. H ₂ OI	60	60	60	60	22		20	Large and medium	++ thin	0	22	3-31-10
91	Grimes	36	"	"	62	62	75	75	24		—	Only mucus	++ + thick	0	—	3-31-10
92	Wickham	3	Breast				75	75	1		15	Fine, soft; clear whey	++ thin	0	26	4-4-10
93	Reed	60 2	6 1/2		70	70	75	75	40		10	Medium and small; clear whey	++ + thick	0	36	4-4-10
94	Grimes	41 1.5	6 3/4		65	65	75	75	11		—	Small, few	++ ++	+	—	4-4-10
95	Peru	13 2	6 1/2		70	70	60	60	1		—	No curds	++ ++	+	—	4-4-10
96	Wickham	6	Breast		80	80	—	—	1		—	Traces	++ ++	0	—	4-4-10
97	Jones	1	"		75	75	—	—	3/4		60	Deep yellow, medium size	++ ++	0	15	4-5-10
98	"	2	"		40	40	—	—	3.5		+	Distinct yellow curd	++ ++	0	—	4-5-10
99	Wickham	7	"		40	40	60	60	2		40	Fine, soft curds	++ ++	0	30	4-6-10
100	Peru	18 2	6 3/4		35	35	60	60	11		35	Small, soft curds	++ ++	0	55	4-6-10
101	"	18 2	6 3/4		80	80	60	60	6.5		20	" " "	++ ++	0	18	4-8-10
102	Reed	2 2 2	6 1/2		1 1/2	1 1/2	75	75	9		1	" " "	++ ++	20	—	4-11-10
103	Bentley	28 2	6 3/4		1-50	1-50	90	90	2.5		50	Medium sized curds	++ ++	0	20	4-12-10
104	Curtis	4	Breast		1-	1-	—	—	18		+	Two small curds	++	0	—	4-12-10
105	Wickham	14 1.5	6 1/2		1-35	1-35	60	60	1		+	Few small curds	++ ++	0	—	4-12-10
106	Bentley	29 2	6 1/2		1-40	1-40	90	90	1		+	Few large curds	++ ++	0	—	4-12-10
107	Oldenburg	8	Breast		1-40	1-40	—	—	2		+		++ ++	0	—	4-12-10

fed case the free acid was +, not enough being recovered to estimate the per cent. The free acid did not necessarily occur in the empty stomach. We have examined many empty stomachs without detecting free acid. We have also detected it several times. In the fasting stomach—the stomach which has received no food for from six to eight hours—we obtained, in 5 infants examined, free acid three times, no free acid twice. We are inclined to believe that infants showing free acid values as high as 10 are in all probability cases of hyperacidity.

The Secretion of the Enzymes.—As stated before, rennet curds can be detected in the breast-fed or hand-fed infant as early as the first day of life.* We have observed that human rennet coagulates both human and cow's milk, while commercial rennet coagulates only cow's milk. Hence the general statement so frequently made that rennet does not coagulate woman's milk. Pepsin is rarely present in the infant's stomach during the first year of life, pepsinogen is almost invariably present. Accordingly, peptic digestion rarely takes place in the infant's stomach, for pepsin does not act in the absence of free hydrochloric acid. It must be remembered that ordinary tests for secondary albumoses and peptones are of no utility in the infant's stomach because such reactions can easily be demonstrated in cow's milk. At the present time only peptone nitrogen estimation by the Kjeldhal method is of any importance. Clark† found this factor practically *nil* in normal infants.

Incidence.—In all infants examined the curdling ferment was present. In all cases excepting those which gave a reaction to free HCl, pepsin was absent. In all cases at some time pepsinogen could be demonstrated by Mett's method.

The Secretion of Mucus.—Mucus is a normal constituent of the infant's gastric contents. It increases in quantity proportionate to the length of time food remains in the stomach. It is always greater toward the end of digestion. The high total acid values sometimes obtained in an infant's stomach contents may be due to the presence of mucus, and are, accordingly, only apparent. If care is taken to select two samples from the same stomach fluid, one free from mucus, the acidity of the sample containing mucus

* In addition to analysis 97, Table 1, we have tested other babies during the first day of life with woman's milk and diluted cow's milk, and have found curds present.

† "The Effect of Certain So-called Milk Modifiers on Gastric Digestion in Infants," *American Journal Medical Science*, 137, p. 827, 1909.

will appear higher when titrated against phenolphthalein. The progress of the secretion of mucus is graphically represented in a rather rough manner by the accompanying curves,* (Chart 4), which simply represent our interpretation of the comparative amount found. They refer more to the physical state of the mucus than to the actual quantity. With a well-washed stomach as a basis for our experiment we start with no mucus; in a short time a slight stickiness develops; this becomes stringy, then thick, and, finally, very thick and plug-like. This is true of breast- and hand-

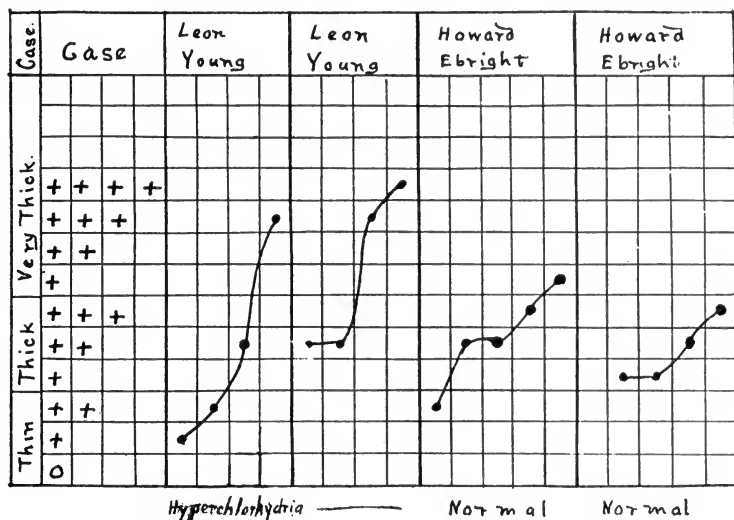


Chart 4.

fed stomachs. When the acidity is greater mucus is often increased.

Basic Calcium Casein Feeding (Lime Water).—When calcium oxide (lime water) is added to calcium casein (milk) in sufficient amount to neutralize any acid present and saturate the proteid until an alkaline reaction to phenolphthalein is obtained, basic calcium casein is formed. So long as this basic condition is maintained neither commercial rennet nor that obtained from human gastric juice can produce coagulation. This is the condition kept up in the test-tube experiment. Reasonable incubation, varying temperature, motion or rest will not bring about coagulation. The amount of calcium oxide necessary to produce this basic condition is not fixed. It varies within wide limits, depending upon the concentration and the acidity of the mix-

* We found no viscosimeter suitable for this work.

ture. Not infrequently, in ordinary so-called good milk, as high as 60 per cent. of lime water may be necessary to neutralize a 3-6-1 mixture.

If for any cause this basic condition is disturbed as by the addition of dilute hydrochloric acid or the development of lactic acid fermentation, which, however, seldom, if ever, occurs in the normal infant's stomach, rennet action is prompt and certain. It is not necessary for an acid condition to have been reached, only enough is required to neutralize the excess which has been added and which is represented by the difference between an alkaline reaction to litmus and phenolphthalein. It must be remembered that much of the acidity of milk is only apparent, and is due to combination of the standard solution with the proteid (alkali proteid). Neutral calcium casein (amphoteric milk) is coagulated by rennet. These are the conditions obtained in the infant's stomach. As soon as food enters the stomach all its activities are stimulated. If the food be basic calcium casein, sooner or later the excess of alkali is taken up by the hydrochloric acid secreted and the calcium casein is in turn acted upon by rennet. There is, accordingly, a period during the sojourn of basic calcium casein in the infant's stomach when it remains intact, and during this time, whatever its action may be, it is exerted

TABLE 2

CONTROL.									BASIC CALCIUM CASEIN								
Case	Control Formula	Amount taken, c. c.	Amount c. c. recovered	Time in stomach, ach.	Character of Curds	Acids			Per cent. of lime water	Amount taken, c. c.	Amount recovered	Time in stomach, ach	Character of Curds	Acids			
						Free	Combined	Total						Free	Combined	Total	
Snyder..	2-6-1	120	15	2 h.	Few fine curds	0	16	18	50	120	0	2 h.	Little mucus in washings	0	0	0	
Rebolt..	3-6-1-R W	240	0	2 "	Three small	0	0	0	40	270	90	2 "	Thick milky material	4	10	10	
		270	15	2 "	Few small & large	0	+	+					Flocculent curds	0	4	4	
		270	54	1 "	Small with whey Granular & whey	0	19	20					23	270	60	1 "	Thick soft curds	0	9	10
William:	3-6-1	270	95	1 "		0	20	20	23	270	60	1 "		0	9	10	
		210	37	1 "	Many large curds	0	18	18	18	270	125	1 "	Few small curds & whey	0	9	9	
		210	102	1 "	Many large and medium	0	10	10									
		210	49	1 "	Large blocking	0	14	14	12½	210	141	1 "	Many small feathery curds	0	8	8	
Ebright.	3-6-1½	240	40	1¾	Large blocking tube	0	24	24	22	240	97½	1 "	Many small and medium curds	0	7	11	
		150	57	¾	Large blocking	0	16	18	30	240	13	1 "	Large thick sour curds	0	30	40	
		240	65	½	Large and small	0	24	24	25	90	22	1 "	Thick milky material	0	—	14	

upon the stomach functions. This period varies, depending upon the secretion of acid. It is shorter in hyperchlorhydria, longer in hypo and achlorhydria. In one case we found no curd formation until forty minutes, while at forty-five minutes a large amount of large curds was obtained. The stomach seemed full of clear, thin, milky fluid at forty minutes. At forty-five minutes only 20 c.c. of this curd material was recovered (acid opening).

Conditions produced in the test tube with rennet solution and basic calcium casein do not obtain in the stomach, for in all instances curds are formed. (Table 2.) These curds vary in their consistency from a thick, milky material, which may be separated by rapid centrifugalization, to large and thick curds, which in our experience were always soft. One has to ask the question, Are these rennet curds (calcium paracasein), or are they acid curds (casein hydrochlorid). When basic calcium casein remains in the stomach sooner or later a point is reached when the gradual pouring out of acid has neutralized the excess of calcium but has not yet united with all the soluble calcium salts. During this stage, rennet, which is ever present, may unite with the now neutral calcium casein to form calcium paracasein curd. If, as is generally the case, acid continues to be poured out, it unites with the calcium paracasein curd to form paracasein hydrochlorid and calcium chlorid. These successive changes must have taken place before hydrochloric acid appears in the free state. The curd found after lime water must be either calcium paracasein or paracasein hydrochlorid, and these are differentiated from each other by their physical characteristics and their solubility in warm 5 per cent. salt solution.

Calcium paracasein curds are tough ductile curds soluble in warm 5 per cent. salt solution.

Paracasein hydrochlorid curds are granular soft curds insoluble in warm 5 per cent. salt solution, but which after washing in water are soluble in weak ammonia water, from which they may be reprecipitated by addition of weak acid.

In our experience the latter curd is the one found in the stomach after feeding basic calcium casein.

The Effect of Basic Calcium Casein on Gastric Acidity.—The acidity of the stomach after a basic calcium casein meal very seldom reaches the acidity obtained after a control meal. The acidity is almost invariably distinctly lowered. (Table 2.) The average total acidity in the control series is 18.4, in the basic series

13.6. Free acid was detected once in the basic series, and in one test the total acid went as high as 40. If this one meal is omitted, the average acidity of the basic series drops to 9.8 as compared with 18.4 in the control. Free acid seldom occurs after a basic calcium casein meal, but regardless of the per cent. of calcium oxide added the proteid becomes saturated with acid. In this respect our results appear to differ from statements made that lime water stimulates excessive flow of acid. This may be true if we take into consideration the amount of acid that is necessary to neutralize the excess of acid-binding substance present in a basic meal. But this does not concern us clinically—it is the proteid combined acid and the free acid which exert their effect upon the subsequent food reactions in the stomach.

The Effect of Basic Calcium Casein on Stomach Motility.—Basic calcium casein does not tend to promote stomach evacuation, as is generally believed. Our cases (Table 2) are too few to warrant us in making a general statement. They are of sufficient number, however, to give the doubt to the generally accepted theory, and they bear out what one must expect if modern physiology, advanced by experimentation on the lower animals, holds true.

The stomach of a healthy infant must be as near a normal organ as can be found during life. It is, therefore, especially well adapted to physiologic research. Psychic elements do not enter into the case, the infant has no fears and it is not hard to find one who will sleep through the entire examination, which may last over an hour. Accordingly it is reasonable for us to expect, if the physiology of man and animals is similar, the pyloric mechanism to respond to the same stimuli as, for example, that of the cat. Particularly through the experiments of Pawlow and Cannon we are led to believe that the pylorus is controlled by acid. Acid opens it, and when acid reaches the duodenal mucous membrane the nervous mechanism which has to do with the closure of the pylorus is brought into action, and is sooner or later overcome by the dissipation of the duodenal acidity. Hence theoretically we must expect slowing in a stomach evacuation after alkaline food, because acid stimulation of the pylorus is thus delayed.

It has been a difficult matter for clinicians to harmonize their clinical findings with the newer physiology, for in the secretory neuroses of the adult, as well as the infant, exactly opposite con-

ditions seem to exist. In achylia we have rapid evacuation; in hyperchlorhydria the tendency very often, indeed, is to delayed evacuation. We have conducted two experiments with the hope of getting some light on this question, in both of which the infants were admirably well adapted for such observations because of their good health and their indifference to the passage and retaining of the tube. Unfortunately one left the hospital before our work was complete.

We selected as a test meal one free from fat, thus eliminating a factor which is known to delay stomach evacuation in animals, and which has been shown by Cowie and Munson* to produce a similar effect in man. Skim milk diluted one-half with water was employed. After several trials we selected sixty minutes as the best period to allow the food to remain in the stomach in Case 1, forty-five minutes in Case 2. With control meals, the acidity of which varied between 6 and 8, the largest amount recovered at the end of the period was 3 c.c. to 10 c.c. We took great pains to have the amount fed, 75 c.c., and the time of sojourn in the stomach, forty-five minutes, constant factors. To accomplish the latter it was necessary to introduce the food by gavage, which was in each case accomplished in the same number of minutes. The acid meal was prepared by titrating with dilute hydrochloric acid (10 per cent.) solution until the acidity desired was obtained. The food was then kept at body temperature for one hour to assure complete combination of acid with proteid. And again in the case of the free acid meal, retested and treated if necessary, to assure the acid value as it entered the stomach. Our cases were so well controlled that although the records of the amounts recovered after the allotted time cannot be said to be absolutely accurate, we think the error varied not more than 1 or 2 c.c. After syphoning off the stomach contents the stomach was washed with a definite amount of warm water, which in all cases was recovered. Any additional amount recovered was calculated as original stomach contents. In an investigation of this character gross differences alone can be considered. The position of the infant was constant in all experiments. (Tables 3 and 4, Charts 5 and 6.)

Taking Case 2 we find that in the control meal only 2 or 3 c.c. remained after forty-five minutes. When free acid is given from 28 to 45 c.c. are recovered. When the total acidity of the meal

* "An Experimental Study of the Action of Oil on Gastric Acidity and Motility," *Arch. Int. Med.*, Vol. I., p. 61, 1908.

TABLE 3. CASE 1. ACID CONTROL OF PYLORUS.

Meal	Acidity of Meal	Amount Taken	Amount Recovered	Characters	Free HCl.	Total Acid
Control		75 c.c.	6.5 c.c.	Fine curds and clear whey; mucus, +++ thick	0	10
Control		75 c.c.	10. c.c.	20% medium and small curds, clear whey; mucus +++ thick	0	14
Acid	10 —	75 c.c.	37. c.c.	10% very fine granular curds, whey milky	0	54
Acid	4-80	75 c.c.	38. c.c.	18% fine granular curds, whey milky; mucus, +++ thick	4	68

TABLE 4. CASE 2. ACID CONTROL OF PYLORUS.

Meal	Acidity of Meal	Amount Taken	Amount Recovered	Characters	Free HCl.	Total Acid	Date
Control	Free Total 0 - 6	75 c.c.	3 c.c.	Small soft white curds; mucus, +++ thick	0	15	4-11-10
Control	0 - 8	75 "	0 "	Wash water contains only mucus, +++ thick	-	-	4-13-10
Acid	10 - 60	75 "	45 "	Large and medium curds soft; mucus, +++ thick	2	40	4-14-10
Acid	4 - 80 - 76	75 "	38 "	18% fine granular curds; mucus, +++ thick	4	68	4-
Acid	10	75 "	27 "	14% fine granular curds; mucus thin	8	68	4-14-10
Acid	0 - 75	75 "	25 "	10% large granular curds; same as before taken	0	36	4-15-10
Acid	0 - 30	75 "	4 "	2½% fine green curds; mucus +++ thick	0	35	4-18-10
Acid	0 - 30	75 "	0 "	Washing clear, few flecks of curd	-	-	4-20-10

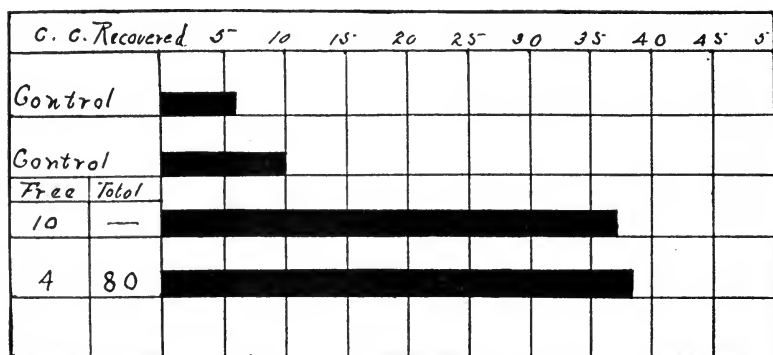


Chart 5, Case 1. Acid control of pylorus.

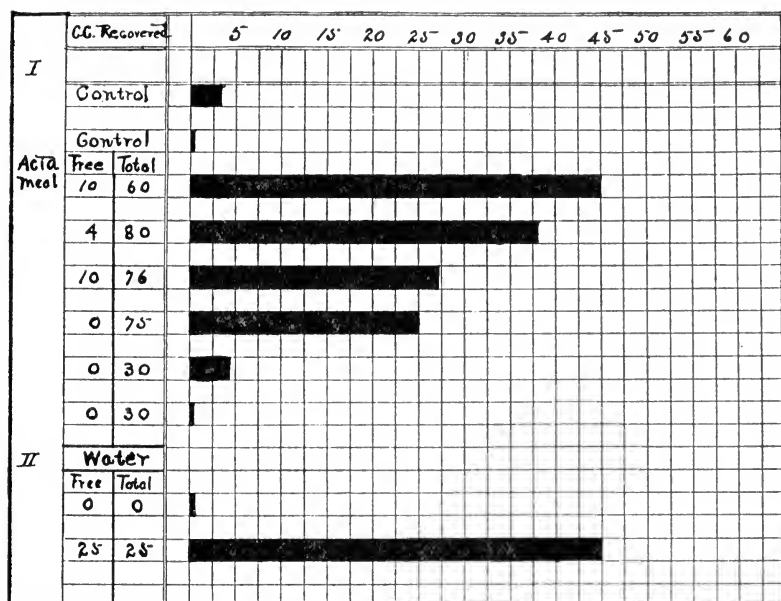


Chart 6, Case 2. Acid control of pylorus.

without free acid is 75, 25 c.c. are recovered. When the acidity of the meal is 30 the evacuation of the stomach is the same as in the control. In the instances of delayed evacuation we have conditions comparable to hyperchlorhydria in the adult. In those instances where the acidity is low we have conditions in a way comparable to achlorhydria in the adult. In other words, the manner of evacuation of the stomach (with this meal) depends upon the degree of acidity present. We also found that by rendering water acid its sojourn in the stomach could be lengthened. (Chart 6, II.) The delay of evacuation must be due to one of two factors:—

(1) Either the discharge of a large amount of acid into the duodenum requires a longer time for its neutralization, hence the duodenal closing reflex is prolonged, or (2) the large amount of acid on the stomach side produces spasm of the pyloric sphincter.

The question—Is the delay of evacuation in the infant's stomach after an acid meal due to the presence of high acidity to the left or right of the pylorus?—remains to be settled.

The Effect of Basic Calcium Casein on Stomach Motility.—So far as our experience takes us we are led to the opinion that basic calcium casein does not tend to promote rapid evacuation

of the stomach in all cases as is generally believed. Our cases are too few to warrant us in making a general statement. We report ten control meals and nine basic calcium casein meals in three babies. The evacuation was the same or delayed five times and increased twice by basic calcium casein as compared with the control meal. If we mass these we find the average amount recovered in the controls 52.7 c.c., in the basic meals 67.4 c.c.

Citrated Milk.—When oxalates and fluorides are added to milk the milk is said to be decalcified. Combinations thus formed are poisonous and cannot be employed in infant feeding. In 1893 Sir A. E. Wright, of London, recommended sodium citrate as a harmless decalcifier of milk for the purpose of preventing the action of rennet on milk proteid. He advised it in $\frac{1}{2}$ per cent. strength, or $2\frac{1}{2}$ grains to the ounce (*Lancet*, July, 1893). As an illustration of the harmlessness of sodium citrate to young infants, I may relate a mistake which occurred in my wards during the past winter. A new nurse assigned to service in the milk laboratory became confused in the weights; instead of weighing out 9 grains of sodium citrate for the infant's formula, weighed 9 grams. This amount was given for two days before it was discovered by the physician in charge of the case. Aside from a few extra stools the infant manifested no symptoms. Shaw and Wheeler are of the opinion that we do not yet know what chemical change occurs when sodium citrate is added to milk. Sodium citrate unquestionably prevents all rennet action, not only in the test tube, but also in the infant's stomach. The curds formed in the stomach are casein hydrochlorid curds and have the same appearance, except for their admixture with mucus, as those formed in the test tube by careful addition of dilute hydrochloric acid. After carefully washing out the acid with distilled water these curds, whether from the stomach or the test tube, are readily soluble over night in dilute ammonia water. They may be reprecipitated from their alkaline solution, which has an opalescent color, by means of dilute hydrochloric acid. When mucus is abundant complete solution is not so quickly obtained. Usually, however, if the proportions are right, most of the curd has dissolved over night.

Our observations on citrated milk were made chiefly for the purpose of determining the nature and the physical state of the curd; this we found was uniformly casein hydrochlorid, fine, granular and soft as compared with the large curds so frequently

found after whole milk and sometimes after ordinary modified milk. Our observations on the effect of sodium citrate upon stomach motility and acidity are only incidental. In the few comparisons that can be made from similar citrated and noncitrated meals recorded in the list of analyses (Table 1), one might say that no particular effect upon the acidity occurs. In some cases the acidity is higher in the citrated meals; in others, lower. We have gained the impression that when citrated meals are employed a larger amount of mucus is poured out. Clark investigated the point of acidity and found it lowered after sodium citrate. In the two following experiments, where small samples of stomach juice were removed from time to time, the following

TABLE 5.—CITRATE.

Feb. 3, 1910.

CONTROL MEAL.

Leon Young, 7 months.

Time	c.c. Recov- ered	Time in Stomach		Curds		Mucus	Acids		
		Hrs.	Mins.	%	Character		Free	Comb.	Total
9:20					[Fed 90 c.c. 3.6.1. Total acid 6]				
9:40	7.5		30	35	Medium sized, soft	+ thin	0	15	25
10:00	7.5		50	40	" " "	++ thick	20	30	60
10:20	8.0	1	70	30	Medium, free from whey	++ quite "	25	30	65
10:40	6.0	1	30	20	Medium, floating in whey. Stomach empty	+++ very "	20	25	55

Feb. 4, 1910.

SODIUM CITRATE MEAL.

Time	c.c. Recov- ered	Time in Stomach		Curds		Mucus	Acids		
		Hrs.	Mins.	%	Character		Free	Comb.	Total
8:40					[Fed 90 c.c. 3.6.1. sodium cit- rate, grs. lvss.]				
9:00	8.0		35	12	Fine, granular, soft, feathery	++ quite thick	0	15	25
9:20	7.5		55	14	" " " "	++ " "	0	20	40
9:40	9.0	1	15	30	" " distinct from whey	+++ very "	15	35	75
10:00	7.0	1	35	8	" " viscid mucus	++++ " "	25	20	65
10:20					Stomach empty. Much mucus in lavage; only a few small curds	14%			

TABLE 6.—CITRATE.

Feb. 16, 1910.

CONTROL MEAL.

Howard Ebright, age 16 months.

Time, A.M.	Formula	Amount Fed c.c.	Amount Re- covered c.c.	Time in Stomach	%	Curds	Mucus	Acids		
						Character		Free	Comb.	Total
9:00	Began to feed									
9:30	Whole milk	240	15	15	3	Size of a pea; free from whey	+ stringy	0	12	28
9:50			24	35	20	Size of a filbert; blocking tube	+ "	0	20	34
10:00			8	55	6	Fine, floating in whey	++ thick	0	25	48
10:30			1	1.15	0	None in wash water. Stom- ach empty	+++ "	0	—	—

Feb. 17, 1910.

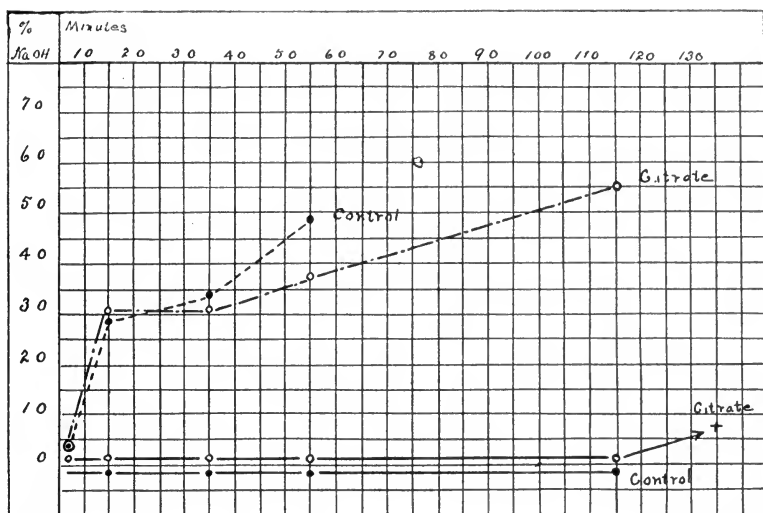
CITRATE MEAL.

Howard Ebright.

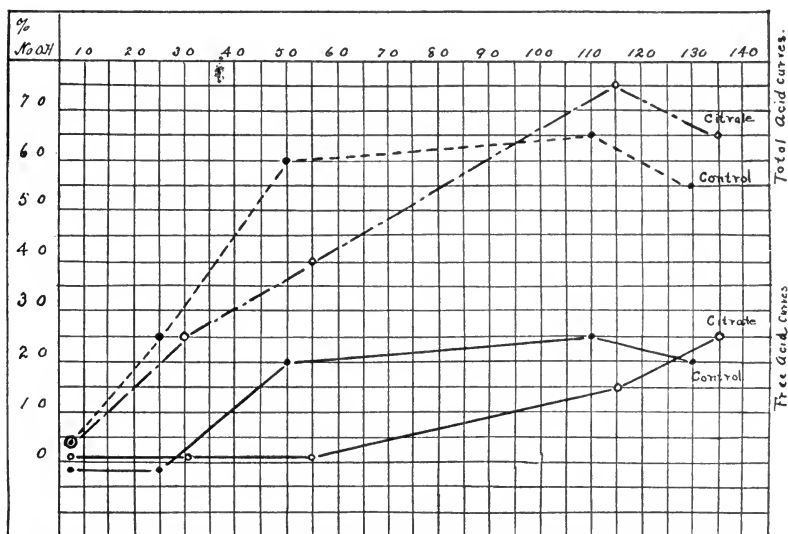
Time	Formula	Amount Fed c.c.	Amount Re- covered	Time in Stomach	%	Curds	Mucus	Acids		
						Character		Free	Comb.	Total
8:40	Began to feed	240								
9:00	Whole milk + sodium citrate grs. viii.		13	15	15	Fine granular; not free from whey	+ stringy	0	15	30
9:20			22	35	16	Granular; free from whey	++ thick	0	14	32
9:40			10	55	5	Granular; whey clear	++ "	0	21	36
10:00			8	1.15	?	Few small granules floating	++ "	0	30	55
10:20			0.5	1.35	0	No curds. Stomach empty	+++ thicker	+	—	—

There was slight regurgitation at 9:20 and 9:40. The tube was never blocked. The curds were distinctly soft as compared with the control.

curves were obtained. (Charts 7 and 8.) In the second case we had a patient who manufactured large amounts of acid. This enabled us to get a free acid curve. (Chart 8.) The appearance of free acid is delayed in the citrate meal, but ultimately reaches the same height as the control. The total acidity rises more slowly, but ultimately exceeds the control. In the first case (Chart 7) very similar conditions are present, except that in the citrate meal free acid ultimately appears just as the last food is leav-



Case of Table 6, showing graphically amount of total acid with citrate and control meals.



Case of Table 5, showing graphically curves for total and free acid for citrate and control meals.

ing the stomach. In the first experiment the amounts withdrawn are not so uniform as in the second. It may be that some knowledge can be gained from experiments of this kind if they are well controlled.

To return again to stomach motility, or the time required for

a certain amount of food to pass the pylorus, which must doubtless be one of the most important factors in the proper feeding of an infant. It usually concerns us little in the ordinary case, in the case which seems to thrive in spite of bad feeding. In the emaciated case, the case of malnutrition, or the so-called difficult feeding case, we are not really doing our full duty if we do not put ourselves in possession of all the facts in the case. The baby who needs it, and *only* he, is entitled to as careful stomach analysis as is the adult.

If at the beginning of a feeding period we find in the stomach retained food in any appreciable amount, our period between feedings must be lengthened or something must be done to hasten the evacuation of what may seem to be a sluggish organ. A condition of this kind must always be regarded with much care. We must be sure the faulty evacuation is due to so-called sluggishness or atonia and not, in spite of vigorous muscular effort, to a pyloric obstruction. Why should we not have varying degrees of stenosis in an infant as well as in an adult, stenosis of the first and second degree, possibly due to the same cause but producing a different group of symptoms. Enquiry into the motility of our cases may be a potent factor in the recognition of stenosis of the first degree and in the skillful after care of the case.

The evacuation of any stomach, infant or adult, depends upon several factors: (1) The amount of food to be propelled through the pylorus in a given time, (2) the character of the food with regard to the mechanical resistance it offers at the pylorus, (3) the propelling force and the factors which go to make up this force, muscle and nerve, and (4) the integrity of the nervous mechanism of the pylorus.

The first postulation requires no comment. The second is open to discussion. It is evident that a marble will have greater difficulty than a pea in passing an elastic orifice, the size of which without undue stretching is slightly less than the marble. Conditions comparable to this may be considered rare ones in the normal infant's stomach. In the ordinary case the comparative size of the curd, we are inclined to believe, in reality does not have so much to do with the rapidity of stomach evacuation as one might think. Most of the curds in the stomach are soft and capable of being easily crushed and propelled through a patent pylorus by normal muscular effort. If the integrity of the nervous mechanism is intact the chemical condition of the stomach con-

tents, we think, may be a more potent factor in delayed evacuation than the size of the curd.

CONCLUSIONS.

(1) The infant's stomach secretes all the digestive juices from the first day of life.

(2) Free hydrochloric acid rarely occurs in the infant's stomach during the active part of the day. It may be found at times in the fasting stomach, at the height of digestion, or at the end of the digestive period.

(3) The evacuation of the normal infant's stomach depends, to a large extent, upon the degree of acidity of the stomach contents. Excessive acidity delays evacuation. A total acidity value varying from 8 to 30 offers the normal stimulus for pyloric relaxation.

(4) Basic calcium casein does not inhibit the formation of rennet curds in the infant's stomach. It delays the formation of curd, delays the saturation of the proteid with acid, delays the acid pyloric reflex, and by so doing delays the evacuation of the stomach contents. The action of rennet on basic calcium casein in the test tube is not comparable with that which takes place in the stomach as the conditions are not the same.

(5) Sodium citrate inhibits the action of rennet in the stomach as well as in the test tube. The curd formed in the stomach, and that formed when dilute acid is added to citrated rennet milk, are casein hydrochlorid curds.

(6) The curds normally present in the infant's stomach are paracasein hydrochlorid.

We wish to acknowledge the courtesy of Professor Peterson and members of the maternity staff in permitting us to use some of the infants in the maternity wards.

MALIGNANT NEW GROWTHS IN CHILDREN.—W. A. Edwards (*American Journal of Medical Sciences*, July, 1909) emphasizes the not infrequent occurrence of malignant new growths in children, particularly those of the female pelvis. He shows that all forms of disease of the adult female pelvis have been recorded in childhood, and urges a more frequent resort to rectal pelvic examination. Tables of collected cases are given. A great majority of the tumors were sarcomata, but a considerable number were carcinomata.—*Boston Medical and Surgical Journal*.

METHODS OF EXAMINING INFANTS' STOOLS. THEIR VALUE.

BY FRITZ B. TALBOT, M.D.,

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Visiting Physician to the Boston Floating Hospital; Assistant Visiting Physician to the Hospital of the Massachusetts Infant Asylum.

The examination of stools in infancy has been cursory until very recently. In the past few years a large number of researches have added much to our knowledge of normal and pathological stools, and many tests have been devised so that gross as well as microscopic particles may be differentiated. The examination of the stool in the diseases of the digestive system is as important as the examination of the urine in the diseases of the kidney, but one cannot treat a perverted digestion simply by examining the stools alone any more than one can treat uremia according to the urinary findings (Hecht). The clinical picture is of just as much value as it has always been, but information gained from the stools is very important supplementary knowledge, which frequently determines the whole course of treatment. The three most important food components are fat, carbohydrate and protein. The two former are very similar in cow's and human milk. The principal difference is that the fat drops in cow's milk are considerably larger and have less uniformity than those in human milk, and the percentage of sugar is less in the former than in the latter. Cow's milk contains about two and half times as much protein as human milk, and about six times as much casein as human milk. There are other chemical and biologic differences in these proteins, such as their organic combination with salts. Further researches are necessary to explain these differences and to establish their importance, but it seems probable that they play a larger part in the differences of digestibility of the two milks than has hitherto been believed.

(1) *Fats*.—A white stool usually indicates a fat indigestion, and a brownish-yellow stool, which gradually becomes lighter and lighter, suggests diminishing powers of fat digestion. Likewise, the odor of butyric acid or a shiny, oily surface means fat. There is one rough test for fat which can be easily used in a home as well as in a laboratory. Place a piece of stool on ordinary soft paper and allow it to stand until the paper is wet through, then

remove the stool and dry the paper thoroughly; if the stool contains a large excess of fat the paper will be oiled. This can be easily seen by holding it to the light or by placing it in water.

A microscopic examination of the stool gives very accurate information about the digestion of fat. Two stains are used, one on each of two coverglass preparations, alcoholic solution of Sudan III* and carbolfuchsin†. These stain the neutral fats, fatty acids and soaps differently. The following table shows these differences:—

STAIN.	NEUTRAL FAT.	FATTY ACIDS.	SOAPS.
Sudan III	Drops staining red.	Drops staining red or crystals which may or may not stain.	Do not stain.
Carbolfuchsin	Do not stain. Remain oily, colorless drops.	Stain brilliant red.	Stain dull red.

After these two coverglasses are examined and the microscopic picture is clear, a drop of glacial acetic acid is allowed to run under the coverglass covering the Sudan III stain, is thoroughly mixed in, then heated until it begins to bubble. Care should be taken not to boil the preparation so much that all the melted fat will run off the slide. This process turns the soaps and neutral fats into fatty acids, which, while warm, appear as large red-stained drops, and, upon cooling, crystallize. This shows the amount of total fat in the stool, while the first two slides examined show the relative proportions of neutral fat, fatty acids and soaps. There is no way of differentiating neutral fat drops from fatty acid drops by Sudan III; it is, therefore, necessary to stain a second preparation with carbolfuchsin (see table) which does not stain neutral fat and does stain fatty acids. These tests

* Sudan III powder, 95% ethyl alcohol. Saturated solution.

† Carbolfuchsin, such as is used in staining for tubercle bacilli. If the stain is too intense it may be diluted with equal parts of alcohol, 95%.

are very simple, quick and valuable, giving accurate and often surprising evidence concerning the digestion of fat. They should always be used. An excess of fat can be easily determined and acted upon; absence of fat very often shows why the baby does not gain, and always means that fat is not the cause of the indigestion. This rough method of estimating the relative proportion of neutral fats, fatty acids and soaps also gives an idea of the digestive functions. If there is an excess of fat, most of which is split, the digestion is normal and assimilation is abnormal; if the majority of the fat is unsplit or only partially digested both digestion and assimilation are abnormal.

(2) *Carbohydrates*.—There can be no doubt that sugars play an important rôle in the pathology of the intestinal diseases of infancy, but not as frequently as some of our German conferees would wish us to believe. Many of the cases which conform with the clinical picture of "alimentary intoxication" (Finkelstein) have been proved to be bacillary dysentery; the fever, nervous symptoms and prostration are due to bacterial infections and their toxins and not to sugar. Cases of sugar intoxication are rare in our clinics, and bacterial infection which is common should be ruled out before the diagnosis of sugar intoxication is made. The troubles which are due to sugar come after it is absorbed or broken down, and it is, therefore, useless to examine the stool for sugar. Yet it is of value to examine the stool for the products of sugar cleavage, *i.e.*, lactic and acetic acid; their presence may often be determined by the odor alone. There cannot be much doubt that a strong acid reaction of the stool, and especially such as burns the buttock, means that the sugar in the food should be reduced. Lactic acid may be demonstrated in many of these stools by the Uffleman* test; this test, however, is not absolutely reliable. The presence of starches may be easily determined by mixing a portion of stool with Lugol's solution,† which will turn the starch blue or violet. If there is a large amount of starch in the stool the blue color may be seen in the gross; if a small amount, it may be recognized only under the microscope. There are practically no unchanged starch granules in a normal stool, and when present they always mean a starch indigestion. (One should not forget that all baby powders contain starch; their presence, therefore, must be ruled out.)

* Ether extraction, filtration, water extraction, addition of a few drops of carbolic and ferric chlorid solution.

† Iodin, 2; potassium iodid, 4; distilled water, 100.

(3) *Proteins.*—There has been much confusion concerning the curds in infants' stools. Ever since the Breslau school found that certain small masses which look like undigested milk (commonly called curds) are formed of fatty acids and soaps, mucous and intestinal secretions, Biedert's original teaching that curds are composed of casein has been disputed. This confusion arose from the fact that there are two distinct kinds of curds—one *small* and *soft*, composed of fat, and the other *large* and *tough*. These *large, tough* masses are composed of casein and undigested milk fat (neutral fat). The amount of fat in the curd depends upon the amount of fat in the milk. The milk fat evidently is entangled in the meshes of the casein when it coagulates in the stomach and passes through the gastrointestinal canal undigested. The action of the digestive juices takes place only on the surface. The writer recently proved by the precipitin reaction that the protein in these curds is cow casein. These curds may be easily recognized by their toughness and are usually white, but sometimes are stained yellow by intestinal secretions. They become extremely hard when dropped into 10 per cent. formalin in contradistinction to fat curds, which are unaffected by the same treatment. The search for casein in the stool is, therefore, of the greatest value. Casein curds, accompanied by symptoms of indigestion, always mean that the amount of casein in the food should be lowered; when this is done there is always a striking change in the clinical picture. Tests may be made for casein in stools which do not contain tough curds by dissolving the protein in alkalies, purifying and testing with a specific anticowcasein serum. No traces of casein have been found up to date in any stools which do not contain tough curds. There is no suitable test for lactalbumin.

Bile.—The corrosive sublimate test for bile is valueless in babies. Recently Triboulet has advised a mercury acetic acid test which he claims will differentiate bile and its products. My experience with this test has been as unsatisfactory as the corrosive test. Mucus is easily differentiated from other components after acetic acid is added to the stool, indicating an irritation of the intestinal mucous membrane, but it may be of little significance to the stool. Hecht has devised a stain* for mucus which is of no more practical value than the acetic acid test. Blood and pus are easily

* Hecht stain for mucus consists in equal parts of 2% aqueous brilliant green and 1% aqueous neutral red. This mixture is diluted to the desired strength. Mucus stains red.

recognized under the microscope and indicate an ulceration of the bowels.

Reaction.—The reaction of stools may be determined by placing pieces of moistened red and blue litmus paper on a fresh surface. The stool of a normal breast-fed infant is acid and that of a bottle-fed infant is alkaline. Schlossmann believes that this reaction is dependent on the composition of the food and the relation of the fats and proteins to each other. When there is three times as much fat as there is protein the stool tends to be acid, and when there are equal amounts of fat and protein they tend to be alkaline. My observations* agree in the main with those of Schlossmann. Starches and sugars apparently do not influence the reaction of a normal stool to a great degree, yet there is not much doubt that carbohydrates tend to make an alkaline stool more acid because they encourage the growth of the normal acid-forming bacteria in the intestinal canal. Proteins, on the other hand, tend to make an acid stool alkaline because they are favorable to the growth of the putrefactive bacteria. Clinically, an acid stool can be changed into an alkaline soap stool by increasing the amount of protein in the food. Pathologic stools may show evidence of either fermentation or putrefaction; in the former instance there must be a fermentative organism plus a carbohydrate food, and in the latter a putrefactive organism plus protein. It is impossible for one organism to live on the other's food and retain its identity. Strongly alkaline stools mean, therefore, putrefaction of protein, and highly acid ones fermentation of carbohydrate.

The application of these tests in the examination of the stools is of great importance and should always be used. Their simplicity brings them within the reach of every practitioner; they are easily performed and take less time than the routine examination of the urine. They put infant feeding on a definite basis and eliminate, to a great extent, guess work.

EXAMINATION OF FECES.

Name Date

I. MACROSCOPIC EXAMINATION.

- (a) Number in 24°
- (b) Size and shape

* The determination of the reaction of 3,000 stools.

- (c) Color
- (d) Consistency and coherency
- (e) Odor
- (f) Abnormal constituents {
 Curds (tough) (casein)
 " (soft) (fat)
 Mucus
 Pus
 Blood
 Membrane
 Masses of food
 Parasites
- Remarks

II. REACTION (litmus)

III. MICROSCOPIC EXAMINATION.

- (a) Muscle fiber
- (b) Starch (Lugol solution)
- (c) Fats* {
 Neutral fat
 Fatty acid
 Soaps
 Total fat†
- (d) Cellulose and crystals
- (e) Mucus (Hecht stain)
- (f) Bacteria {
 1. Tubercle bacilli
 2. Gram negative
 3. Gram positive
 4. Iodophilic
- (g) Parasites and ova

IV. CHEMICAL.

Blood.—Guaiac test

* NOTE.—

STAIN.	NEUTRAL FAT.	FATTY ACIDS.	SOAPS.
Sudan III.	Stains red.	Usually stains red.	Does not stain.
Carbolfuchsin.	Does not stain.	Stains brilliant red.	Stains dull rose red.

† NOTE.—Sudan III + one to two drops glacial acetic acid + heat. Total fat estimated in the form of fatty acids.

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OXYGEN IN WHOOPING-COUGH.—Weill and Morriquand (*Lyon Med.*) find that the administration of oxygen at the commencement of the paroxysms in whooping-cough is of service in warding off bronchopneumonia and suffocation. The oxygen is given at each paroxysm, and, if possible, just as it begins. The cyanosis subsides and the patient is relieved. The gas renders the lung aseptic and thus able to resist infection. It must be used freely, at least 10 or 12 liters for every paroxysm, and if there is danger of bronchopneumonia it should be inhaled every hour.—*British Journal of Children's Diseases.*

* Since this paper went to the publisher, Hecht's "Die Faeces des Säuglings und des Kindes," has been published. This book contains a very complete bibliography.

A METHOD OF DEALING WITH ILLY-NOURISHED INFANTS.*

BY FRANCIS H. GLAZEBOOK, M.D.,

Morristown, N. J.

What to do with the illy-nourished infants and young children of the poor, especially of our large cities, is a social problem of no mean proportion and one which is arousing much thought among those interested in this line of work.

I use the term illy nourished to include malnutrition from any cause, but the class of cases which I wish especially to emphasize are the malnutritional diseases peculiar to infancy as a result of errors in feeding, as atrophy or marasmus, rickets and all grades of the malnutrition of the chronic gastrointestinal disturbances.

These conditions are so closely allied to the subject of artificial feeding of infants that you may naturally expect that I have some specific treatment or some special feeding method to advocate. This is not the case, however. It is not my purpose to discuss the feeding question at this time. We are all aware of what has been accomplished of late years along this line; of the wonderfully improved methods and the generally improved conditions, both in regard to teaching and practice. And while there still exist differences of opinions as to the *modus operandi*, the essential principles of substitute feeding are more uniform than ever before, and there are many good plans by which the healthy infant may be successfully fed. Judging from my experience, it is not so much the plan followed as it is the man behind the plan.

Those of you who have worked extensively with this class of cases in our large cities must have realized that in spite of the better understanding of feeding and of the increasing facilities in the way of hospitals, dispensaries, day nurseries, summer homes and all other institutions for the care of sick children, the results obtained in dealing with this particular class of cases is still most unsatisfactory. One reason for this is the fact that they are chronic conditions; their course of treatment must be a long one. The hospital can only keep them until the acute exacerbation for which they are brought in has been relieved; the summer home or floating hospital can only give them a limited num-

* Read at the Annual Meeting of the New Jersey State Pediatric Society, Atlantic City, June 27, 1910.

ber of days, they must be sent back to make room for others; the dispensary has the ignorant parent and the unhealthy environment to contend with. Even those cases which are benefited by their stay in institutions must be sent back to faulty conditions of life at home, and they soon come back again or appear at some other hospital to repeat the same performance. So they go the rounds and finally succumb to some complication or to the exhaustion due to the repeated attacks. Those cases which have been kept in institutions indefinitely only reach a certain degree



FIG. 1. A TYPICAL HOME TAKEN AT THE TIME OF THE NURSE'S VISIT.

of improvement. The collective life of an institution, no matter how well managed, is not the place for these cases; they need individual care, and it must be intelligent care; they need healthy environment; they require fresh air constantly.

Dr. Henry D. Chapin, of New York City, after a long experience with this class of cases under the best institutional conditions possible, feeling that better results were possible, interested a few well-to-do women in a scheme to see what could be accomplished along the lines of family life. Acting on this idea the Speedwell Country Homes Society was inaugurated in 1902, Morristown being chosen as a suitable place to carry on this work, and it has since been in successful operation. I have the honor

of having been the attending physician during this time, and am deeply indebted to Dr. Chapin for his help and coöperation.

As the little work we are carrying on is rather unique, and is arousing considerable interest among those who know about it, I wish to describe our methods and will do so as briefly as possible. I want to say that of course we know that there is nothing new in the farming out of children, but the old methods of farming children were subject to many evils and were abandoned on this account. I know of no work of this kind carried on exactly after this fashion.

The first requirement for this work is a town not too far away and noted for its naturally healthy conditions. The only attendants or servants required are a doctor, a nurse and a superintendent. The superintendent should be, if possible, a woman,



FIG. 2. FIVE CASES OF MARASMUS ON ROAD TO RECOVERY.

preferably an old nurse, who knows the community chosen for the work. Her duties are to carefully select women of good reputations who have raised children of their own and who have good, clean homes, and who are willing to board and take care of sick babies; she must procure the babies from the city and place them in the homes and return them to their own homes when discharged; she also attends to many other necessary details in dealing with the mothers and foster mothers and endeavors to see that proper methods of care and feeding are carried on after the child is returned to its home. The nurse visits each home every day and has general supervision of the care of all cases, teaching the foster mothers how to make the food and carrying out any treatment requiring the services of a trained nurse. The doctor visits the cases as often as he deems it necessary, directing all treatment, and receives a report from the nurse every day.

Some of the special features of the work are the following:—

(1) There is no limit to the age at which a child is received; any little one from a day old is provided for.

(2) The only limit to the number of children taken is the amount of money available. Fifteen dollars cares for one child for one month.

(3) There is no limit to the length of their stay in the country. They are kept, if their parents are willing, until they are absolutely well and fool proof.

(4) The work is not confined to the summer months. Our

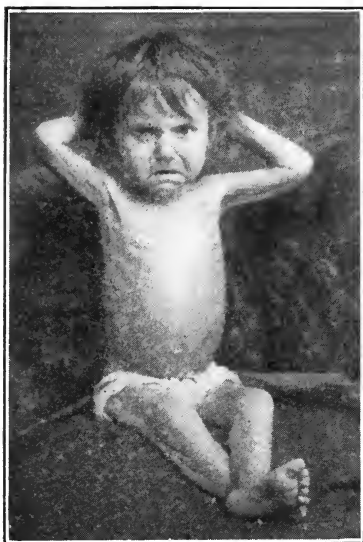


FIG. 3. CHRONIC GASTROENTERITIS (MALNUTRITION).

Entered November 22, 1905. Age,
16 months; weight, 14
pounds, 12 ounces.

Discharged February 15, 1906.
Age, 19 months; weight,
23 pounds.

busiest season is the winter, and children are received the year round.

(5) There is no institution to be kept up, no nurses or servants to pay. Every cent goes to the care of our little ones, except the salary of our superintendent and of the nurse, and the doctor's expenses.

(6) There is no red tape about admission. Cases are accepted from anywhere as long as a doctor's certificate in regard to contagion comes with it.

We are receiving babies now from the Post Graduate, Babies' Hospital, Roosevelt, Bellevue, Presbyterian, besides many so-

cieties for the improvement of the conditions of the poor and individuals interested in the work. The average number of babies taken care of at present is from 30 to 35. Many societies pay the expenses of the babies they refer to us to obtain the benefits derived from this work.

In an article on this work Dr. Chapin has pointed out that "infants suffering from malnutrition as a result of prolonged faulty care and feeding, in institutions, when fed on the bottle the vast majority die, no matter how carefully or how scientifically

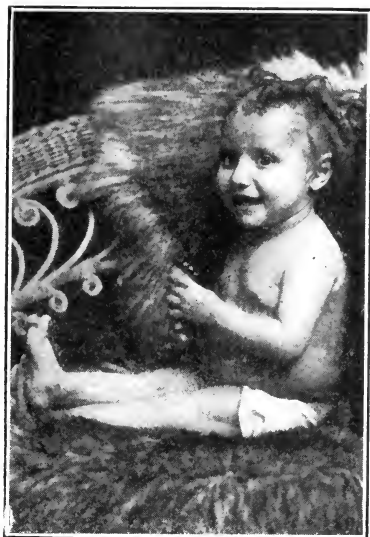
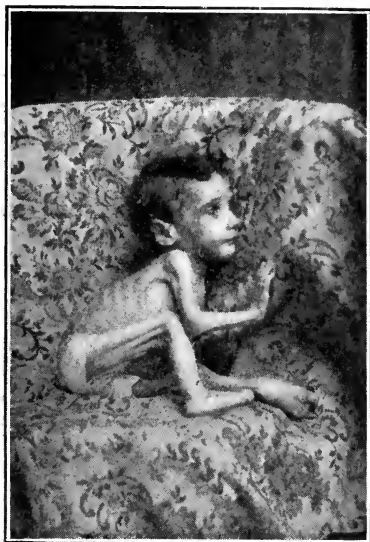


FIG. 4. MARASMUS.

Entered May 18, 1905. Age,
13 months; weight, 9
pounds.

Discharged September 8, 1905. Age,
16½ months; weight, 18
pounds, 8 ounces.

they are fed." "These babies have no place in institutions. The experience of this Society shows that if a fairly good individual environment can be secured with a good foster mother, and careful, intelligent oversight of the feeding maintained, a great number of these cases can be restored to good health." As to the older children, many of them, after recovering from acute illnesses, when returned to their homes suffer for the want of proper care and food. We take such cases and keep them until they are well and strong and better fitted physically for the trying conditions under which they live.

We have on our list about twenty-five homes. Most of the

women are now well trained in the care of these babies, and we try to limit the number in each home to one little baby and one run-about. We give our women \$12 a month for each baby under two years, and \$10 for those over this age, and we pay for any necessary extra or special food and all drug supplies. It is quite remarkable how much interest these women take in this work, and how patiently they labor with these sick babies. Some of them become so attached to babies that it is hard to give them up, and we have had several children adopted by the foster mothers. There is a certain pride among them, each one trying to get as good results as the others. As would be expected, some of them do better than others, so we have them graded accordingly. Any disobedience to orders is punished at once by taking away the babies and putting the home on the black list; but we very seldom have any trouble of this kind. This extra money means a great deal to this class of women, and they are very fearful that if anything goes wrong with their babies some one else will get their job.

The following figures will show you what we have accomplished in this work from the beginning, March 19, 1902, to May 1, 1910:—

Total number of cases admitted	1,302
Under six months	224
Between six months and a year	102
“ a year and two years	126
“ two and three years	59
“ three and five years	118
Over five years	673
	—— 1,302

Total number of deaths	117
Deaths under six months	90
“ between six months and a year ..	20
“ “ one year and two years .	6
“ over two years	1
	—— 117

Cause of death:—

Bronchopneumonia	4
Cholera infantum	1
Chronic gastroenteritis, c. malnutrition .	28
Chronic enterocolitis, c. malnutrition ...	23

Croupous pneumonia	2
Rachitis	3
Diphtheria	1
Marasmus	48
Meningitis	2
Scarlet fever	1
Prematurity	3
Tuberculosis	1

— 117

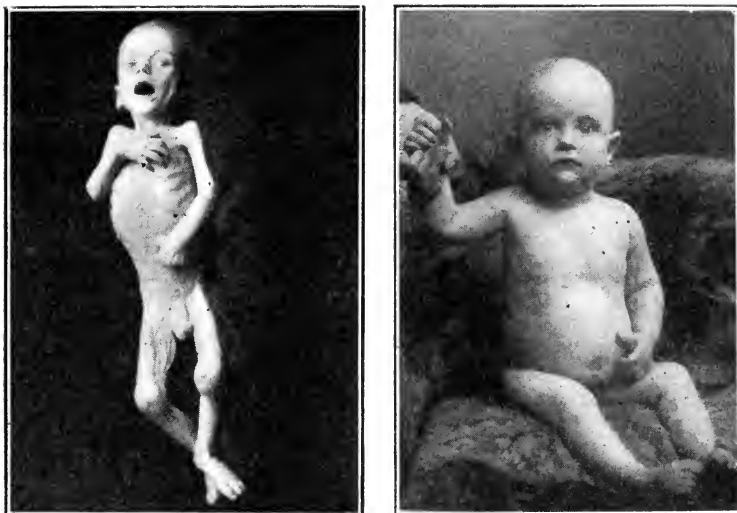


FIG. 5. MARASMUS.

Entered November 6, 1903.
Age, 11 months; weight,
12 pounds.

Discharged May 26, 1904. Age,
17½ months; weight,
23½ pounds.

At first sight these results may not seem very brilliant, but if you will consider the figures carefully you will see that about two-thirds of the cases under six months and four-fifths of those between six months and a year were cured, and that there were only eight deaths in those over one year. These younger babies we get are a bad lot and are sent to us as a last resort, and our results with some of these have been remarkable and have surprised both the doctor referring the case and the parent.

As you know, the greatest mortality in such cases is in those under one year, and the largest majority of them under ordinary conditions die.

We believe that this is the best plan yet devised to deal with

these infants and so feel justified in reporting this work, and trust it may be tried in other cities. Already another branch is developing in New York, and we have received letters of inquiry from several cities. To summarize, in closing, using Dr. Chapin's words:—

(1) Boarding out under this plan in any district of the country noted for its healthy conditions is the best plan for dealing with these cases.

(2) With constant attention to diet and hygiene on the part of a doctor and nurse who are familiar with this class of cases and competent to deal with them.

(3) The infant must be kept as long as necessary. We never send away one to make room for another; the work is carried on the year round.

(4) The educating in a given neighborhood of a number of foster mothers, who become expert in handling these cases under conditions quite unlike those offered by the best institutions and far superior to them.

(5) No capital is required to be tied up in buildings. If contributions fall off the work is contracted until more comes in, when it expands again. The plan is economically sound and practically efficient.

A CASE OF PSEUDODIPHTHERIA DUE TO THE PNEUMOCOCCUS.—P. Hamilton Robertson (*British Medical Journal*, July 31 and August 7, 1909) reports the case of a girl, eight years of age, who was admitted to the hospital certified as suffering from diphtheria. Her breathing was rapid and labored, she was distinctly cyanosed, and had a hoarse cough. Her temperature was 102°F., and pulse 140. Both tonsils were thickly coated with a whitish membrane, and she coughed up some thick, whitish material. On inspiration there was considerable epigastric retraction, and on auscultation there was evidence of widespread bronchopneumonia in both lungs. In view of the obstruction to respiration, tracheotomy was performed. The membrane seemed softer than usual, so a smear was made which, on examination, showed a pure culture of what was morphologically the pneumococcus. The case was then diagnosed as one of bronchopneumonia, with tonsillitis and laryngitis due to the pneumococcus. The patient was desperately ill, but recovered. She was greatly relieved during the first two days by the administration of oxygen.—*Boston Medical and Surgical Journal*.

ARTHRITIS DEFORMANS IN CHILDREN. REPORT OF A CASE OF STILL'S DISEASE.*

BY ELEANOR C. JONES, M.D.,

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Arthritis deformans is a rather rare disease in children; indeed, some of the text-books on diseases of children fail even to mention it. It is one of the diseases of which much has been said and written in the last decade, but there is still a great deal to be cleared up concerning it. The modern sciences of radiography and bacteriology have, to a great extent, modified old ideas and thrown light in new directions, especially in the study of the etiology and pathology of the disease, so that it is now possible to make various tentative classifications of the different forms of this affection. That suggested by McCrae¹ in Osler's *Modern Medicine* is, to my mind, quite satisfactory. The term arthritis deformans is used by him to designate a chronic disease of the joints or the structures about them; those forms with a definite etiology (as gonorrheal and tuberculous arthritis) being excluded. He divides the different varieties into the (1) hypertrophic form (osteoarthritis), where there is bony overgrowth on the edges of the articulating surfaces, and where the process may also include changes in the cartilages. A variety of this form is the important spinal form known as spondylitis deformans. (2) The atrophic form is where there is atrophy of the bones and loss of cartilages in the affected joints. The muscles are also very much wasted in this form. (3) The periarticular form is where the changes are most marked in the synovial membrane and periarticular tissues. This is the most frequent form in both adults and children. The cases first described by George F. Still,² in 1896, as a "hitherto undescribed form of chronic joint diseases in children," is classified by McCrae as a subdivision of the periarticular form. This is, in the present state of our knowledge, a proper classification. Still based his paper on 22 cases which had come under his notice, and defined the affection as "a chronic progressive enlargement of the joints associated with general enlargement of the glands and enlargement of the spleen."

The following general description of the disease is based on

* Read before the Philadelphia Pediatric Society, Dec. 13, 1910.

the cases reported by a number of writers. The disease begins most frequently between the first and second dentition, and more in girls. The onset may be acute, with fever, or even chills. The larger joints first become slightly stiff and gradually others become involved. The joints become fixed, so that there is very little motion, especially in extension, and the joint involvement is accompanied by great muscular wasting. The interossei muscles are apt to be very much atrophied. Sweating is often profuse and there is some secondary anemia, but no endocarditis or valvular disease. Pericarditis and pleurisy sometimes develop. Stress must be laid on the character of the enlargement of the joints. There is a general thickening of the tissues about the joint, but there is no osteopathic growth or bony grating, although creaking, either of a tendon or a cartilage, is frequently present. The joints affected in order of frequency are the wrists, the cervical spine, the temporo-maxillary articulation, ankles, elbows and fingers. The fingers frequently show a fusiform swelling, owing to involvement of the periosteum. There is no redness or pain of the joints, and they are only tender on forcible movement. If the joint affection subsides the glands become smaller, but increase again in size if the joint becomes worse. The glands chiefly affected are the supratrochlear and those along the brachial artery into the axilla, and those in Scarpa's triangle, and those deep in the iliac fossa and in the posterior triangle of the neck. The spleen also increases in size on an exacerbation of the disease. A remarkable feature of the disease is the general physical arrest of development, especially when the disease begins before the second dentition. Two curious symptoms are sometimes noticed: these are a slight prominence of the eyes, though not sufficient to be called exophthalmus, and a waxy color of the skin and flushed cheeks.

A great deal of work has been done in recent years in attempting to determine the cause of this disease. Out of this work several well-known theories have developed, beginning with the trophoneurotic theory, which seemed to cover a number of the features of this affection, as the symmetrical joint changes, the extreme muscular atrophy, the associated neuritis, the skin symptoms, which includes the sweating and vasomotor flushings, and the more rare pigmentation of the skin, and, lastly, the increased knee-jerk which is commonly present, which shows that there must be some irritation of the spinal centers. A second theory

is the toxemic theory; that is, that all the changes are the result of toxic absorption from the intestine, the intestine itself first being invaded by organisms, which are not themselves pathogenic, but become poisonous by the toxins which they produce. The view now, however, generally accepted is that the disease is a definite infection due to some specific microörganism yet unknown.

Poynton and Payne³ have procured evidence in favor of the infectious nature of at least the acute forms of this disease. They found diplococci in the synovial membrane of the knee joint in a man of sixty-seven years suffering from arthritis deformans. After culture this was injected into the venous circulation of rabbits and a severe deforming arthritis developed, and diplococci were afterward isolated from the exudate produced in the joints of the rabbit.

Bannatyne, Wohlmann and Blaxall,⁴ Chauffard and others, have obtained organisms from the joints, but no constant association with any one organism have been proved. In Still's disease many of the symptoms are very suggestive of an infection, particularly the rapid onset, febrile course and marked enlargement of the spleen and glands. It is believed that the starting point of the infection may be from the tonsils, the teeth (pyorrhea alveolaris), the alimentary tract, or some preceding inflammatory pelvic disease. In studying the etiology we should consider the causal relationship of infections occurring shortly before the onset of the joint disease. Influenza and tonsillitis seem to stand in important relationship to subsequent joint developments. Streptococcic infection of the tonsils and the pharynx is likely to be followed by arthritic complication. Diarrhea and dysentery may also probably stand in a causal relation to arthritis deformans, either by direct infection by the organisms producing the intestinal trouble, or by the absorption of toxins from the intestines.

It is an interesting point to decide whether the arthritis deformans may result from acute articular rheumatism. Some of the English writers⁵ believe that it may so follow. The case I report seems to show that while it resembled rheumatic fever in the beginning of the original attack, yet it was really arthritis deformans developing with acute febrile symptoms. In rheumatic fever no permanent change is left in the joint, while in arthritis deformans when once a joint is attacked it does not entirely clear up, and there is always a tendency to some change in the joint.

The joints affected are different in the two affections. The joints of the neck, the temporomaxillary joint and those of the thumb are rarely attacked in rheumatic fever. It is probable that the nervous and arthritic phenomena are the end results of some poison or poisons which have a special action on these structures. The metabolic changes which frequently occur in the intestinal tract, such as the diminution or absence of hydrochloric acid free or combined, and the presence of albuminous putrefaction, as shown by the presence of indican in the urine, are also results, and not causes, of the affection.

Arthritis deformans is a disease which may occur at any age, except in early infancy. The "Cambridge Report"⁶ mentions one case that began at eighteen months. In Garrod's series of 482 cases only 3 cases are reported as beginning before ten years of age, and in the "Cambridge Report" of 200 cases only 5 cases began before ten years of age.

With the increasing interest in this disease, both on the part of the internists and the surgeons, a surprising number of cases have been presented and numerous methods of treatment suggested. Probably the most hopeful method of relief for disabled joints has been practiced by the orthopedic surgeons,⁷ who, by the breaking up of ankylosed joints and the cutting of contracted tendons, have restored the usefulness of many otherwise disabled limbs.

The following case is that of a little girl in whom the disease began at the age of eight years, or about four years previous to admission to the Children's Department of the Woman's Hospital of Philadelphia, on June 21, 1910.

Both the family and personal history were uneventful up to the time of the first illness, in 1906. In this year she had an attack of what was supposed to be a mild attack of typhoid fever, which illness, however, was attended by high fever, profuse sweating and soreness and stiffness of the joints. On getting up she complained of her heels hurting her and also that her knees were stiff. In July of 1907 she had another attack of illness, which was diagnosed by the attending physician as acute articular rheumatism. Since this second attack she has been gradually getting stiffer and more joints are becoming involved. Stiffness began in her hips, knees, elbows, wrists and fingers in the order named. The girl is very much undersized and undeveloped for her age. Her height on admission to the hospital was four feet four and a half inches, and her height is the same now, and her

weight on admission 45 pounds and 12 ounces. The following notes were then taken: Her gait is very stiff, she cannot bring her heels down in walking, and there is much stiffness in ankles, knees and hips. She stands with both knees and hips slightly flexed, and these joints are very much enlarged. Her elbows are held at right angles; she can flex them somewhat, but they cannot be extended. The wrists are very much enlarged and are very stiff. There is a slight flexion of the metacarpals on the carpals, and there is flexion of the distal and second phalanges. There is a fusiform swelling on the middle finger of both right and left hands, and there is marked atrophy of the interossei muscles. The thumbs do not take part in the characteristic deformity of the other fingers, but there is creaking of the cartilages or tendons between the first and second phalanges of the hands. There is much wasting of the muscles of both the thenar and hypothenar eminences. None of the joints are painful, red or tender. She has a lateral curvature of the lumbar and lower dorsal spine, the left shoulder blade and left hip are one inch higher than those on the right side. All the muscles of the back, chest and shoulders are markedly atrophied, as are also the muscles of arms, hands and legs. The atrophy is probably partly produced by inactivity and partly through reflex trophic influences. There is considerable rigidity of the temporomaxillary articulation and also of the cervical region of the spine, which latter condition gives her something of the appearance of so-called "pokerback." She has fairly good motion of her shoulder-joints and her toes are stiff, but they can be moved.



Dr. Jones's case of arthritis deformans, showing contracted knees, hips, and elbows and wrists, also the marked atrophy of muscles.

I am indebted to Dr. Esther Weyl for the radiographic plates of this case. The plates of the cervical vertebræ, of hips, wrists, knees and hands show conclusively that the changes seen in the joints are periarticular and that there are no bony outgrowths. In the hips, knees and elbow joints there is seen some slight roughening and infiltration on the articular surfaces. The osteoporous condition of the bones is plainly seen in these plates.

The knee-jerks are exaggerated. Her heart sounds are normal. Repeated examinations fail to determine any increase in the splenic area. The inguinal, axillary and epitrochlear glands are somewhat enlarged, but not markedly so. Still says that the spleen and glands increase in size when the disease is undergoing an exacerbation and diminish in size when the disease subsides. In this case the febrile course shows that the disease is still in a mildly active stage. In a recent paper by Koplik⁸ he says that in his experience the enlargement of the lymph glands, liver and spleen is seen mostly at the onset of the attack. This case is in the fifth year of the disease, and so this may account for the absence of splenic and liver enlargement.

She perspires continuously and freely⁹ and she shows marked vasomotor ataxia, so that it is easy to write on her chest, and her cheeks are also generally much flushed. The sweating and the flushing may be due to paresis from the toxins acting on the sudoriferous and vasomotor centers. Her pulse is always rapid, from 80 to 120. She ran an intermittent temperature from normal to over 100°F. daily for four months, showing a low grade of inflammatory change. For the past month the temperature has been normal. The examination of the blood showed: hemoglobin, 75 per cent.; erythrocytes, 4,900,000; leukocytes, 7,600. Both the Moro and Von Pirquet tuberculin tests were negative.

The child's mother said that the child had had several attacks of sore throat, with enlargement of the glands, so that we decided to remove the tonsils as a possible source of the infection. Dr. Margaret Butler operated on the child on August 12th, and found the operation very difficult, because of partial ankylosis of the jaws. The tonsillar tissues was examined in the laboratory, and found to contain a few diplococci but no streptococci. After a test-meal the stomach contents were found to contain very minute quantities of either free or combined hydrochloric acid. The urine gives a marked indican reaction. The synovial fluid from the knee joint was aspirated and examined and found to be sterile.

The treatment has been first to endeavor to improve the general condition of the child by fresh air and a plentiful and nutritious diet. The child has been given daily massage. To assist in overcoming the secondary anemia she was given Bland's pill and liquor potassii arsenitis. To supply the deficient acid of digestion she has been given dilute hydrochloric acid, 10 drops in mucilage of acacia after each meal. The orthopedic surgeon has also assisted in the treatment of the case by performing forcible flexion and extension of both knees after etherizing the patient. The legs were placed in plaster cases in a straight position, and after three days the casts were removed and the knees gently flexed, and then again placed in plaster cases. This was repeated daily for about three weeks. It is now proposed to do tenotomy on the ankylosed joints. The child is much improved in her general appearance and has gained nearly 9 pounds in weight from June 21st to November 1st. She has also improved motion in the operated joints.

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TREATMENT OF VINCENT'S ANGINA.—J. D. Rolleston (*British Journal Children's Diseases*, July, 1910). In a critical essay the author discusses various points in connection with Vincent's angina, based on 32 cases that have come under his charge. For treatment he thinks in most cases it is sufficient to swab the affected part morning and evening with undiluted tincture of iodine. If the fetor is excessively penetrating the throat may be syringed with a solution of potassium chlorate and myrrh. In one case, where the ulceration advanced in spite of these measures, the application on two successive days of powdered methylene blue to the ulcers was followed by rapid healing. Internal medication is usually unnecessary.—*Prescriber*.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, Held January 12, 1911.

DR. THOMAS S. SOUTHWORTH, CHAIRMAN PRO TEM.

A CASE OF CONGENITAL GOITER.

DR. EDWARD W. PETERSON presented this case. The patient was but five weeks old. Her parents were Hungarians and both were healthy. There was no history of syphilis, tuberculosis, cancer or goiter in the family. The child was normal except for the swelling on the right side of the neck. There was some difficulty in breathing during the first hours after birth; this soon subsided and up to the time of her admission there had been no dyspnea nor inconvenience whatever.

The physical examination showed a tumor of the right side of the neck, filling the submaxillary space; this extended downward nearly to the clavicle. Its surface was moderately firm in consistency and it did not fluctuate at any part. Below and to the sides there was felt distinct nodulation.

An incision was made parallel to the border of the right sternocleidomastoid muscle. A fibrous capsule which surrounded the growth was opened and the tumor was dissected out without any great difficulty. There was very little hemorrhage, although on several occasions it became necessary to stop operation because the infant ceased to breathe. Artificial respiration was employed for twenty hours after the operation. Except for a high temperature, 105°F., which immediately followed the operation, and a slight bronchitis, there were no special features worth recording until the ninth day, when the child had a convulsion which lasted about five minutes. On the thirteenth day there appeared twitchings in the extremities and the eyes rolled from side to side. On the day following there were almost constant slight convulsive movements of the hands, arms, legs, as well as of the muscles of the face. As soon as it was discovered that the tumor was thyroid,

believing that the whole gland had been removed, thyroid extract was administered, and within twenty-four hours the tetany ceased.

PATHOLOGIC REPORT.

DR. FREDERICK E. SONDERN made this report. The tumor was horseshoe in shape; one side was composed of a large elongated tumor mass, measuring 6 cm. in length, 4 cm. in width, and 3 cm. in thickness. The other side was composed of a small tumor measuring 4 cm. in length, 2½ cm. in width, and 2 cm. at its greatest thickness. These two tumors were joined together at the concavity of the horseshoe by an isthmus of fibrous tissue. Both of the tumor masses had a slightly irregular lobulated appearance.

Sections taken from both tumors showed the same structure, which was that of the thyroid gland. The acini had undergone a slight adenomatous proliferation and were filled with a very dense colloid material, the greater number of them being very much distended by it to the dimensions of small cysts. The epithelium was very much infiltrated by intra-acinous pressure of the colloid. Nowhere did the epithelium show any malignant proliferation. The entire growth was surrounded by a thin, fibrous capsule.

The diagnosis was adenoma and colloid degeneration of the thyroid gland (goiter).

DR. PETERSON said that except for a few minor ills the patient had been healthy. The points of interest in this case were (1) the presence of a congenital tumor of the neck, which proved to be a goiter; (2) the abnormal location of the thyroid gland; (3) the accidental complete thyroidectomy; (4) the development of tetany; (5) the disappearance of the tetany after the administration of thyroid extract; (6) the subsequent normal physical and mental development of the patient.

Dr. Peterson said the following questions naturally arose: Was all the thyroid tissue removed at the time of operation? Why did tetany develop? Would the child continue to develop normally?

DR. JOHN ROGERS said that the first question that arose in his mind regarding the child presented by Dr. Peterson was, Had all the thyroid tissue been removed? It seemed to him hardly possible that the child should grow as this one had without some

thyroid. Not long ago a case was reported in the literature in which sections were made of the heart muscle and two distinct masses of thyroid tissue, about one-quarter of an inch in diameter, were found located in that muscle. There were, no doubt, a few cases apparently without thyroid glands, but who had thyroid tissue located somewhere in the body.

The question of the origin of such a condition was both curious and interesting. In the fetus this gland was said not to functionate before the seventh and a half or eighth month. From that time the colloid material might collect and act. Possibly there might be some obstruction to the outlet of this colloid material developed during fetal life from a chronic strumitis.

Dr. Rogers thought that Dr. Peterson should be congratulated upon the results he obtained. It was possible that the child might have to be fed thyroid some time in the future to insure good health, especially at the time of puberty, when thyroid symptoms were very likely to be shown. The child should be, in his opinion, carefully watched.

DR. A. JACOBI said that from what Dr. Peterson had told them it was only the right lobe of the thyroid that had been removed. A congenital goiter like the one presented was apt to grow in all its parts; the case presented was, therefore, an exceptional one. If both lobes of the thyroid gland had been removed, together with the isthmus, the probabilities were that the child would have suffered more from the beginning of the disease; then the doctor would have felt compelled to remove all. Dr. Jacobi thought that the probability was that the parathyroids had been removed as well, and this would explain the occurrence of tetany at the time. If the entire thyroid had been removed tetany would have been present all the time. What had been accomplished, however, was very fortunate.

It was stated that the tumor was located high up; that was explained by the fact that the thyroid in the fetus and in young babies was situated higher than in the adult. All cases of congenital goiter were of that nature; they were located higher in the neck and, therefore, it was easier to mistake it for a hygroma; a simple hygroma might be found in this same situation and without a microscopic examination a mistaken diagnosis was easy to make. In looking over the European literature Dr. Jacobi said he was surprised to note the small number of cases seen in this

country among those of early years when compared to the number abroad; there were comparatively such a small number of congenital cases of goiter. On the other hand, he believed that a great many cases of goiter that were not considered to be congenital were, in fact, congenital. For instance, sarcoma of the kidney was seldom observed by mothers in babies before the age of two, three or four years; before that age no symptoms were reported, yet many were congenital. Similarly many cases of goiter in small children were congenital, but were not noticed, because they were too small and did not give rise to symptoms of a serious nature. That was probably the case in this instance. Such mistakes in diagnosis were easily made, and many such instances have been mistaken for hygromata. A goiter was either parenchymatous, that meant real goiter tissue, or there was a hypertrophy of the cellular tissue similar to what was found in fibromata of the uterus. One should, however, always insist upon looking for colloid material in these cases, which might have been present at an early time and diagnosed afterward under pressure from growing intercellular tissue.

The result in Dr. Peterson's case was a fortunate one, both for the doctor and the patient; they saw very few such cases. In Demme's work, published thirty odd years ago, it was stated that among 650 cases of goiter in the young, 50 odd could be traced to congenital origin. If Demme was alive to-day, Dr. Jacobi thought that he might be able to collect 1,000 more such cases. A very concise and instructive article on the same subject was contained in Ballantyne's "Antenatal Pathology."

DR. EDWARD W. PETERSON (closing the discussion) said that the operation was undertaken with the diagnosis of lymphosarcoma—a wrong diagnosis. When the specimen was examined after its removal it was thought that the entire gland had been taken away.

THE PROPER MANAGEMENT OF FOUNDLINGS AND NEGLECTED INFANTS.

DR. HENRY DWIGHT CHAPIN read this paper. He said that the subject of infant mortality was now in the air; a heavy mortality had always existed; it seemed to him that there was a belated struggle in the efforts to reduce it and stop such a waste of life. It seemed strange that while the general death rate had

been lowered throughout the civilized world, the infant mortality had remained stationary. Steps were now being taken to reduce this now in the line of encouraging maternal nursing. To improve the milk supply a more accurate study of substitute feeding and a better knowledge on the part of physicians, regarding infantile physiology and pathology were necessary. There was one aspect of the question that had not received the attention it deserved; that was, the management of foundlings and neglected infants without proper home care. This was a class that enormously swelled the death rate. The first step to improve the conditions should be the removal of these infants from institutions, improve the feeding methods and personal hygiene; they should not be collected and retained in large numbers in any one domicile. Such infants showed a progressive loss in weight, especially those infants under the age of six months. Accompanying this often there was a marked dryness of the skin, a wearing off of the hair from the occiput, etc. They were prone to get pneumonia, usually of the hypostatic variety, and this often was the terminal condition. Communicable diseases were very rapidly spread in institutions. The time had come for the medical profession to recognize the fact that infants should not be collected and kept in asylums or institutions of any kind. This was not because of any relapse in the care of the infants in these institutions, but the system itself failed because it was wrong.

Dr. Chapin made a distinction between the hospital care of infants and the asylum care; the latter dealt with well babies, which might become ill during their sojourn in the institution; this made a radical difference. Whereas, those in the hospital were received because they were undoubtedly sick; these were the ones that should be discharged as early as possible. They should be discharged as soon as possible, and then followed up by members of some society like the one inaugurated by the writer in his work with babies at the Post-Graduate Hospital in 1890, which work had been in successful operation ever since. In place of the institutional care of these infants the writer strongly recommended an application and systematizing of boarding-out and a careful following up system. This avoided the dangers of institutionalism and gave the care required for this class of cases. He proposed the abolition of the larger asylums and institutions for the care of babies, substituting for them many collecting

stations. These stations should act as clearing houses where babies whose physical condition permitted could go for a day or so. These boarding-out places should be in the vicinity of the city and all that was required was a small part of a tenement-house. The babies who were not doing well in the city should be sent to these boarding-out places, where they could receive the same careful oversight. The only way to test this theory of Dr. Chapin's was to try it out in practice; this he had done since 1902. The Speedwell Society was formed for boarding-out infants at Morristown, N. J. In the operation of this work the following features were emphasized:—

(1) Boarding out in certain districts of the country called for healthful surroundings; (2) constant attention should be paid to the diet and the hygiene on the part of the doctor and nurse, who should be familiar with this class of cases and competent to deal with them; (3) the infants were kept as long as necessary until the feeding was regulated and digestion and assimilation sufficiently improved, which would result in an increase in weight; (4) the training up in any neighborhood of a number of fathers and mothers who were constantly taking infants in their homes, so that they might become fairly expert in the handling of them and under conditions that were totally unlike those offered by the best institutions.

Since March, 1902, 1,386 infants had been cared for at the Speedwell Society, and 501 of them were under two years of age. The number of deaths were as follows: Under six months the number received was 241, and 91 died; between six months and one year the number received was 120, and 22 died; between one and two years the number received was 140, and 6 died. There was only one death over two years of age among 885 cases. Practically all the younger children would have died if they had been kept in institutions; many were the typical marasmus cases.

If the plan elaborated could be carried out generally, a large proportion of the infants could be saved. Very little capital was needed; the plan he outlined had proved to be economical, sound and efficacious.

DR. A. JACOBÍ said it was well known that the mortality of infants under six months of age was high—about 40 per cent. Every care should be given the infants from the very beginning; they should have the best of surroundings, the best nursing, the

best care possible. If this was done the mortality percentage would not be as high as 40 per cent. for infants under six months of age. Under ordinary circumstances the average mortality of children under one year of age was about 29 or 30 per cent. The cases referred to by Dr. Chapin under six months of age were some well and some diseased, and this fact should be borne in mind when 40 per cent. mortality was referred to. That was a high mortality for the average child. Dr. Jacobi had been through many experiences, and he knew how babies would die. He recalled the time when he kept the books of a certain institution in which were small babies; no baby ever came into that institution at an early age who remained there three months and lived. In looking over the records Dr. Jacobi found that every baby that lived there three months was a dead baby. This fact he called to the attention of the directors, and proposed that the babies be farmed out. The result was that Dr. Jacobi was asked to resign; he told them he preferred to be expelled, and expelled he was. This happened forty years ago. This farming out of babies he insisted upon was not consented to until after his expulsion, and then with unsatisfactory results. He hoped and trusted that Dr. Chapin would have better results, and also that those present would do all in their power to help him in carrying on the work he outlined in his paper. This should not be his last paper on this subject; if it was, the work would soon be forgotten. The subject should be taken up again and again, not neglected at all, and there would be different results.

Dr. Jacobi quoted from an address which he made in 1872, recommending the boarding-out of foundlings, and also read a letter written in 1871 by the Commissioners of Charities, advising such a system, and with the reading of this forty-year-old letter Dr. Jacobi hoped that all would lend a helping hand in aiding Dr. Chapin in what he proposed to do.

DR. S. JOSEPHINE BAKER, Director of Child Hygiene, Department of Health, said that the mortality rate as given by Dr. Chapin was particularly interesting, because it was taken from both the convalescent and sick babies. The problem attached to the high rate of mortality among foundlings and neglected infants seemed to her to be worthy the attention of all. It should be remembered, however, that foundling institutions received both the sick and well children. Dr. Baker presented a map of the Borough of Manhattan, which by means of colored pins showed every death

under one year of age that occurred during June, July, August and September, 1910, in private homes, in institutions, etc. It was shown that from May to November (six months) the mortality in three foundling hospitals was 18 per cent. of the total mortality of the Borough of Manhattan. There was no doubt but that the mortality rate in institutions for babies was high; in institutions and among babies under one year of age the average mortality rate was about 40 per cent.

Dr. Baker agreed with Dr. Jacobi that it was time to seriously consider the situation when institutions furnished 18 per cent. of the total mortality during the summer months; this merited the attention not only of the medical profession, but of health authorities and of everybody who was interested in the social and economic aspects of the situation. To lower the death rate among babies required that more children be placed out in homes as advocated by Dr. Chapin.

HASTINGS H. HART, LL.D., Director of the Department of Child Helping, Russell Sage Foundation, said that for many years he had had experience in dealing with the line of work outlined by Dr. Chapin, ten of them in an Illinois institution, where they cared for a large number of infants, and he was in a position to endorse what Dr. Chapin said regarding the effectiveness of boarding out these children. It should be borne in mind, however, that the physicians living in every community had it in their power to cut the mortality among this class of infants square in two, even before Dr. Chapin had a chance to get them. The mothers first came directly under the care of the physician, whose influence was very powerful; and these infants must come under his care first. If he was able to get the mother's confidence he could exert a very powerful influence with regard to what should be done with the baby. Dr. Hart had attended many conferences on the subject of infant mortality, and he had never found any division of opinion among those present on this—"the mother's milk was what the baby most needed." He had found in many instances that the mother had given up nursing her baby on the advice of her physician or friends, as illustrated in the following instance. A woman from the country came to the city to be confined; she was attended by some physician. Some hospital received her because she might be valuable clinical material. The baby that came into the world was a side issue. The baby was a load for the mother, and many times the physician, as well as the

nurse, advised against the mother nursing her infant. One should say to such a woman, "This is your baby; the baby is innocent; but it has a right to a fair start in life, which you are able to give it." *Give the babies the mother's milk.* Advise the mother that if she would care for her baby, you would care for her. Insist upon every mother nursing her infant. Laws had been passed in certain states punishing any woman who abandoned her infant; if a law was passed to punish every mother who refused to nurse her infant, without good and sufficient reason, the problem under discussion he believed would be, in a large part, solved. In one of the western states a bill had already been introduced into the legislature requiring that every woman, when possible, should nurse her own baby, and imposing a penalty upon any one who attempted to persuade any woman not to nurse her baby.

It was a great cause of regret that some women could be persuaded to send their babies to a so-called "baby farm" so that they might go out to wet-nurse. The right way is to persuade them to divide their own milk, nursing their own as well as another baby. Many women forgot the sacred obligations God had placed upon them. They should be urged and constrained to care for their babies during the nursing period. Dr. Hart said he was surprised and delighted at the cordial response that these ideas had met from members of the medical profession.

Dr. Hart stated that the Child Helping Department of the Russell Sage Foundation, of which department he is director, had made a preliminary study of the management of foundlings and neglected infants in twenty-two institutions. Dr. Hart said he had forgotten the exact number, but it was not far from 40,000, and out of that number the death rate was about 40.5 per cent.

DR. FRANCIS H. GLAZEBROOK, Morristown, N. J., said that the features of the Speedwell method which most appealed to him were as follows:—

(1) There was no limit to the age at which a child was received. Any little one from a day old was provided for.

(2) There was no limit to the number of children taken. It was simply a question of sufficient funds.

(3) There was no limit to their length of stay. They preferred to keep them until they were strong and healthy.

Dr. Glazebrook said he wished to correct a prevailing impression, which was evident from the previous discussion, that they

were dealing with well babies. The Speedwell Society had no use for well babies. Their cases, most of them, were the severe types of malnutrition, and, to emphasize what Dr. Chapin had already said, the cases reported under one year would have, practically all of them, died under hospital methods of treatment. While they took children who needed care at any age, it was these young babies, suffering from atrophic and malnutritive diseases, which they were most interested in. And it was in this class of cases that the Speedwell Society got its best results.

They never returned babies because they were going to die. They had seen such wonderful recoveries in what looked like hopeless cases that even the foster mothers never gave up hope. Out of nearly 1,500 children treated since the beginning of this work, they had only sent back of their volition 33. Most of these cases developed some condition which required hospital attention; some were returned by the request of the parents, who, thinking they would die, preferred to have them die at home.

A very interesting point which was worth mentioning was the fact that their babies suffered very little from diarrheal disturbances. During the past summer they did not have a case in those babies already in the Society, and even those cases sent to them from different hospitals with histories of persistent diarrheas improved very promptly. This was especially interesting, as the hospitals from which these babies came were equipped with the most modern methods of dealing with the feeding problem; and it was also an indication that something more than scientific feeding was necessary in the treatment of these conditions.

They had no specific method of feeding; their babies were fed on the common sense plan. They usually continued the food that the baby was getting when it came to them. If, after a fair trial, this food did not seem to be the right thing, they then changed it as the condition indicated.

To indicate the character of the cases with which they were dealing, photographs were shown. Most of the deaths occurred, practically all, during the first months of the babies' stay. If they survived this length of time they usually recovered. The pictures shown were not picked at all. They were simply cases which had been taken from time to time for the purpose of advertising, in order to procure funds for the continuance of the work.

With regard to the difficulties of the work, occasionally they had trouble in getting a woman to carry out orders explicitly.

There was, however, a demand for these babies. The \$12 a month which was paid to the woman for their keep was a good deal of money to them, and as they tried to keep one baby and one older child in each family this was quite an item to this class of women. In fact, this part of the work was a charity in itself, as there were many cases where the money received from the Speedwell Society had more than paid the rent and kept together these little homes. These women soon learned that unless they did as they were told the babies would be taken away from them, and many of them had been with them since the work started, nine years ago, and had proven by their results their ability to carry out and obey orders. He said that he would be very glad and pleased at any time to have any one interested come out and inspect the homes and the work in general they were doing.

DR. ROWLAND G. FREEMAN said there could be no doubt but that there were many advantages attending the farming out of babies, but the figures which had been presented accentuated the disadvantages of institutions and the advantages of boarding out. For instance, Dr. Baker had stated that babies came to their institutions healthy and then became sick and died. He said that the exact conditions in these institutions were little understood. They all believed in the boarding-out system and used this method as far as possible. Most of the children when sent to the institution were far from well; many of them suffered from hereditary syphilis, others from neglect. The children that were boarded out were the best ones that had been sent to the institutions, because these women would not take unpromising children; and the same was true of wet nurses, so that the best children were boarded out and the worst were left to the doctors to feed in the institutions, and the successful feeding of such children was a most difficult problem. Moreover, the boarded-out children, if they did badly or became sick, were returned to the hospital, frequently dying there. This again diminished the mortality of the boarded-out children and increased that of the institutions. The figures presented, therefore, giving the relative mortality in children boarded out and in institutions, needed material qualification.

The ideal method would be to wet-nurse the poor babies and artificially feed the better ones; but this system had not as yet seemed possible.

With regard to the so-called hospitalism, this did not exist

in all institutions. The babies, in some institutions, did very well; and their mortality compared fairly well with that given from Morristown; even with artificial feeding they often showed a low mortality. For instance, recently there was an outbreak of measles in one institution with 35 cases and no deaths; at another time there were 70 cases and only two deaths. In this institution the windows were kept wide open. Hospitalism really meant suffocation.

The amount of money paid for the care of these babies in institutions was insufficient for the purpose. It is said that the cost of the care of one baby in some institutions was \$1.50 a day; while he believed that it cost the City of New York \$1.07 a day at Randall's Island. The City of New York gave these institutions 45 cents a day for every child under the age of two years, and 35 cents when they were over two years. These institutions were poor and the aid from the city was wholly inadequate.

DR. HENRY KOPLIK said he was deeply interested in the subject under discussion, and he appreciated the fact that any discussion on mortality figures was very unsatisfactory and very unfair. They had better postpone any comparisons of mortalities until they could obtain proper weapons for calculating, *i.e.*, the birth records. There was a distinction to be made between the healthy baby of one year and the sick baby. Decided efforts should be made to get people to care for these infants. The subject of the evening was one that hospital men in particular were interested in. When a baby similar to the atrophic babies of Dr. Chapin was admitted to the hospital wards, it was apparently a hopeless task to attempt to feed it. Dr. Chapin's plan was the best, and it was a pity that it was not in more general use. In the hospital wards a patient who was cured of an enteritis became atrophic if retained and relapsed. Some babies disappear from one hospital to turn up in another; thus they go from one institution to another, abandoned, finally, by the parents.

The plan of Dr. Chapin's Dr. Koplik believed to be an ideal one. The great problem that confronted them all was, What were they to do with the babies after their discharge from the hospitals?

DR. SIDNEY HAAS called attention to the relative cost of maintaining babies in institutions and said that institutions could not be run on a pay of \$12 per baby per month. The cost per child should not be less than \$5 per week.

DR. HENRY DWIGHT CHAPIN (closing the discussion) said that these 241 babies under six months would have died in institutions with every window open, so that 60 per cent. figure was all to the good, especially among young babies. The average time the babies remained in the homes was about four months; they were kept there until they were really better. Among 1,386 cases the average time they were cared for was four months. What they wanted to know was just how such a system would work out, and, after eight years' experience, they were able to report favorably. Some photographs showed infants atrophic and under-nourished as they were sent out from the institutions; other pictures showed the marked improvement after an average of four months' farming out.

CYCLIC VOMITING IN CHILDREN.—Comby (*Arch. de Méd. des. Enf.*, October, 1909) gives details of 104 cases of recurrent attacks of uncontrollable vomiting in children. The attacks last for one or several days (the patient being apparently well in between), and are found in children generally between the ages of two and six years. The sexes are affected equally, 50 of the author's cases being boys and 54 girls. In 6 cases two or three members of a family were affected. In 62 there was a neurotic and gouty family history. Dyspepsia or some infectious disease frequently preceded the onset of the vomiting, but appendicitis was one of the commonest antecedents. Ten cases were fatal, and in these fatty degeneration of the liver and gastrointestinal lesions were found. The attacks come on suddenly with constipation and great prostration. Vague abdominal pain is sometimes complained of. The temperature at times is high, but is not always raised. Comby found appendicitis in fifty of his cases, and he regards appendicectomy as the best means of stopping the vomiting. Treatment consists in giving alkalis to contract the evident acid intoxication, and during an attack lavage may arrest the vomiting. The author further advocates the administration of powders containing .25 gram each of calcined magnesia, benzonaphthol and sodium bicarbonate with .01 gram of powdered nux vomica twice a day for ten days at a time. The vomiting recurs every month in some cases, and in others at longer or more irregular periods. A sweet or acid odor of the breath is present just before or during the attacks.—*British Journal of Children's Diseases.*

THE PHILADELPHIA PEDIATRIC SOCIETY.

December 13, 1910.

CHARLES A. FIFE, M.D., PRESIDENT.

VOLKMANN'S ISCHEMIC PARALYSIS.

DR. J. T. RUGH showed a child, aged six years, who had suffered a fracture of the lower third of the left humerus three and one-half years ago. It was dressed on an anterior angular splint, which had to be changed at the end of a week because of ulceration in the flexure of the elbow, when an internal angular splint was applied. In two days marked ulceration of the flexor surface of the forearm occurred, which required over two months for healing. The fracture united firmly, but flexor contraction of the fingers and hand took place and the skin of the hand broke down upon the slightest pressure. Six months later Dr. Rugh uncovered the median nerve in front of the elbow for two inches and freed it from adhesions. At this time he had constructed a brace somewhat after the plan suggested by Robert Jones, of Liverpool, but added an arm-piece to the hand portion and a Strohmeyer screw underneath to assist in straightening. This could not be kept on because of the tendency to break down, and nothing was done until this fall. In September the splint was systematically applied for a half hour twice daily, increasing up to four hours at the present time. There has been no breaking of the skin and the hand is almost straight with the forearm. Recovery will occur in this case if the treatment is continued persistently.

DR. J. K. YOUNG said he was much interested in this subject, having spoken recently at the Academy of Surgery, at which meeting he recommended the Jones method of treatment, either before or after the operation. Many cases of ischemia are relieved by extending the fingers first and fixing the wrist and, after this has been accomplished, extending the wrist upon the arm.

ARTHRITIS DEFORMANS IN CHILDREN.

DR. ELEANOR C. JONES reported a case of arthritis deformans, Still's type. (For this article in full see p. 135.)

DR. YOUNG said that he was much interested in this case. He has recently gone over the subject thoroughly, and divides these cases into four groups—traumatic, pathologic, pathogenic, and the metabolic or toxic cases. Some of these cases are curable, such as one of his, in which the cause was pseudodiphtheria

bacilli lodged in a discharge from one ear. Treating the ear caused joint symptoms and recovery followed treating the ear. He has reported another case which recovered, in which the arthritis complicated kidney disease. The bony, articular changes occur late in the disease, the periarticular changes occurring earlier. Whenever the cause can be discovered early and removed, these cases can be cured.

DR. RUGH referred to a case in which the process began at twenty-two months of age. It was neuropathic in type. Treatment did not stop the progress of the disease. Dr. Rugh administers tincture of iodine, well diluted, increased up to the point of tolerance in these cases, with good results. In many cases it relieves the joint symptoms better than any other remedy he has tried.

DR. D. J. MILTON MILLER showed the photograph of a child of nine years with rheumatoid arthritis. The infectious origin appealed to him, since these cases begin acutely, with enlarged glands, liver and spleen in the Still type. He believed rheumatoid arthritis, or chronic infectious arthritis (a much better term), is a different disease in children from that seen in adults; at least, only the hypertrophic stage is seen; the atrophic stage is never reached. Children, especially in the Still type, seem to recover in spite of Still's poor prognosis. One never sees adult cases that began in childhood, nor had Dr. Miller ever met with one in his reading; hence he concludes that juvenile cases must recover. Dr. Miller has recently seen a case of ten months' standing in a boy of twenty years, following an ankle joint injury, in which remarkable improvement has occurred. He advises rest during the acute stage and later massage, hot baths, electricity and active movements. Especially must the patient be encouraged to move and work the affected limbs himself.

DR. EMERY MARVEL suggested that the deformity resulting might be prevented by Murphy's method of introducing formalin or turpentine to cause phagocytosis.

DR. T. A. O'HARA referred to an old woman over sixty, who had had arthritis deformans for years, but seemed to get along fairly well. She fell recently, and since that time all of her joint symptoms have grown much worse.

DR. J. H. MCKEE said that this was the first of Still's type that he had seen. He also referred to an older case of arthritis

deformans, who has been kept in fairly good condition by means of X-ray and static electricity.

THE DIAGNOSTIC VALUE OF A BLOOD EXAMINATION IN PERTUSSIS.

DR. JOHN A. KOLMER, by invitation, read this paper, pointing out the high mortality of pertussis during the first three years of life, and emphasizing the necessity of prophylaxis by early diagnosis and isolation. He reports blood examinations in 43 cases of coughing. Six of these cases were examined late in the course of pertussis. Of the other 37 cases, in which a clinical diagnosis could not be made, 13 were diagnosed positive, and of these 11 developed clinical symptoms of the disease. Eighteen were given a negative diagnosis, but 3 of them developed pertussis clinically. Six were held as suspicious and 2 of these developed the disease. Of all the cases which turned out to be whooping-cough, 81.25 per cent. had been diagnosed correctly by the blood examination. All were suffering with scarlet fever also, most of them being convalescent. In the presence of other infections, which in themselves are apt to disturb the blood formula, it is better to be guided by the total number of leukocytic elements in a cubic millimeter of blood rather than by the percentages.

DR. S. S. WOODY said that, where many children are kept in one ward, any means of promptly discovering whooping-cough is of great value. Dr. Kolmer's work has resulted in a routine blood examination at the Philadelphia Hospital for Contagious Diseases whenever any child is heard to cough suspiciously, especially in the scarlet fever wards. It helps an early decision and can be of great value when taken in addition to the other symptoms.

DR. J. CLAXTON GITTINGS said that in hospital practice patients with pertussis are most apt to be admitted for a coincident pneumonia or tuberculous infection. The history in these cases is sometimes wilfully withheld or the desperate condition of the child strongly impresses the resident to the exclusion of a careful anamnesis. The presence of a leukocytosis, with an increase of the mononuclear cells, is of distinct aid in the diagnosis of such cases. In bronchopneumonia the increase of leukocytes is usually of the polynuclear type, while tuberculosis often fails to produce any marked increase in the white cells. While the blood pictures should not be considered as a final and definite proof of the existence of pertussis, yet it helps to a conclusion in cases which cause real "diagnostic anxiety."

DR. KOLMER referred to 2 fatal cases of pneumonia, which complicated pertussis, in which he made the autopsy. Before death the number of leukocytes and small lymphocytes rose in the case of bronchopneumonia, while the small lymphocytes decreased before death in the child with lobar pneumonia.

CONGENITAL CYSTIC DEGENERATION OF THE KIDNEY.

DR. H. BROOKER MILLS reported the case of a child of fourteen months admitted to the Medico-Chirurgical Hospital with an enormous growth on the left side of the abdomen, which the mother had noticed seven months before. This had greatly increased in size during the seven months. Blood examination showed 4,600,000 red and 17,600 white blood corpuscles, with 70 per cent. hemoglobin. The X-rays taken only showed that the growth was not an enlarged spleen. Dr. W. L. Rodman operated upon the baby, removing the growth, which was found to show congenital cystic degeneration of the kidney. The child left the hospital in good condition, but has died since.

DR. J. STEWART RODMAN said that polycystic disease of the kidney was comparatively rare, only about 300 cases being found in the literature. Only 10 per cent. of these cases were unilateral. The condition exists in two forms, the congenital and that found in adults past middle life. The entire kidney is involved, sometimes weighing sixteen pounds. The cyst contents vary from a thin watery fluid to a thick grumous, even bloody one. The most probable explanation seems to be that of Shattuck, who believes that the mesonephron fuses with the metanephros, the proper kidney tissue growing into the Wolfian body, while remnants of the latter become the seat of the cysts scattered through the renal tissue. Polycystic kidneys may occur with other malformations. According to Osler, bilateral tumors in the renal region, hematuria, accompanied by such signs of chronic interstitial nephritis as muddy skin, arteriosclerosis, cardiac hypertrophy, abundant urine of low specific gravity, with abundant albumin and casts, should strongly point to this condition. The only treatment is nephrectomy, when the condition is unilateral. Of 35 operations, 25 recovered, but few were cured.

DR. S. C. BURNS said that benign tumors of the kidney were rare; while malignant growths are uncommon, they are more frequently found in children than in adults. Dr. Burns gave the details of Dr. Rodman's operation upon this case.

DR. BORDEN S. VEEDER added that cystic kidney following inflammatory lesions might be confused with congenital cystic kidney. But the contents found differ, as mucoid and colloid cysts may be found near each other in the congenital form. The unilateral cases with this condition are very rare. He mentioned 2 cases in which the condition was diagnosed as cysts of the kidney, but in neither was any cyst found.

TYPHOID INFECTION INVOLVING ONLY THE GALL BLADDER.

DR. WALTER G. ELMER reported the case of a girl of sixteen who developed cholecystitis with a temperature of 103° F., or a little above, with marked daily remissions. The gall-bladder was distended, painful and very tender and easily palpable. The patient could not turn on the right side because of the increased pain. The usual clinical symptoms of typhoid fever were absent. At the end of one week the gall-bladder began draining, distention and tenderness disappeared, the temperature fell to normal and, except for a slight rise on the following day, remained absolutely normal throughout. Widal test was negative just before the gall-bladder drained and positive the next day. Three rose spots appeared on the abdomen the day the temperature fell to normal. Eleven other patients had been infected with typhoid fever from the same milk supply. Apparently the patient resisted the infection except her gall-bladder, which probably became the seat of a mixed infection by the colon bacillus and typhoid bacilli. The cystic duct was blocked and drainage prevented. There was sufficient systemic reaction to cause rose spots and a positive Widal. The rapid convalescence and absolutely normal temperature would lead one to conclude that there were no sloughing intestinal ulcers or extensive involvement of the mesenteric glands or lymphatic system generally. She was well in a very short time. The case was interesting because of the difficulty in making the diagnosis and the possibility of surgical intervention.

DR. MARVEL asked whether it could not have been a simple cholecystitis.

DR. HARRY LOWENBURG asked whether a blood count had been made.

DR. ELMER said that the leukocyte count was 7,000. This child had had infected milk, and 11 other cases had been due to it. No blood cultures were made. The patient had never had typhoid fever before this illness.

BOOK REVIEWS.

PRINCIPLES OF PUBLIC HEALTH. By THOMAS D. TUTTLE, B.S., M.D., secretary and executive officer of the State Board of Health, of Montana. Pp. 186. Yonkers-on-Hudson, N. Y. World Book Company, 1910.

PRIMER OF HYGIENE. By JOHN W. RITCHIE, Professor of Biology, College of William and Mary, Virginia, and JOSEPH S. CALDWELL, Professor of Biology, George Peabody School for Teachers, Tennessee. Pp. 184. Yonkers-on-Hudson, N. Y. World Book Company, 1910.

Every year adds to the knowledge which we have as physicians of the proper way to live so that we may be strong and active, and may avoid disease. To each of us comes the task to be teachers of our patients in the manner in which they shall order their lives, but none of us can give the proper attention or time to go into it thoroughly as should be done. As an aid to accomplishing this, these little books are very efficient as well as being useful in their intended sphere, that of school text-books. It is not an easy task to put into plain and simple language the newest truths of hygiene and sanitation, but the authors seem to have accomplished it in these volumes, and to have produced attractive and scientific books. Their mission is all out of proportion to their size or their cost, for their readability and the attractiveness of the illustrations will make appeal to a very wide circle of readers, adult as well as child. They supplement the earlier volumes of the series by Dr. Ritchie, "Primer of Sanitation" and "Human Physiology," and although they overlap a little and the illustrations are sometimes duplicated, they are both needed.

DIE FAECES DES SAUGLINGS UND DES KINDES. DIE BEDEUTUNG UND TECHNIK IHRER UNTERSUCHUNG (*Kinderarzt in Wien*). By ADOLPH F. HECHT, with preface by PROF. TH. ESCHERICH. Berlin and Wien: Urban & Schwarzenberg, 1910.

This book is a pioneer in its field and is as unique and complete in its application to the physiology and pathology of digestion in infancy and childhood, as is Schmidt and Strassburger's classic, "Die Faeces des Menschen." The book is up to date, complete, and clear. It states facts and not theories, and is the more valuable in that it gives the sources from which these facts were obtained. We commend it to the student as an excellent text-book and to those pursuing research as the most complete and unbiased résumé of the subject up to date.

ARCHIVES OF PEDIATRICS

MARCH, 1911.

ROYAL STORRS HAYNES, PH.B., M.D.,

EDITOR.

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

OPEN-AIR SCHOOLS.*

We are all so accustomed in these days to the outdoor treatment of tuberculosis, and to the outdoor life in general, that while we have all of us heard of open-air schools, we are perhaps inclined to think of them as merely adjuncts to tuberculosis day camps or the like, a method of employing the minds of the children who are obliged to be in those places, whereas the open-air school deserves much more than this. It should be regarded as a distinct entity and as having a place in our educational systems rather than in our systems of therapeutics.

The idea of the open-air school began in Germany, where, in 1904, there was established at Charlottenberg an "open-air recovery school" designed for backward and weak children who could not keep up with their classes and yet were not mentally

* "Open Air Schools," by Leonard P. Ayers, Ph.D., Associate Director Department of Child Hygiene, Russell Sage Foundation, New York. Doubleday, Page & Co., 1910.

deficient. The idea was to cure and to teach at the same time, for it had been found that in school the children were sick, while at sanatoria they improved in health but fell back mentally.

This "Forest School" at Charlottenberg kept the children out of doors all day under proper medical supervision. The children arrived at eight in the morning and returned home at seven at night. They were fed at frequent intervals and properly clothed for the outdoor exposure. The periods of instruction were in the morning, with intervals of five minutes after every half hour of teaching. After dinner the children rested for two hours, and the remainder of the day was devoted to informal teaching and play. This school was open for three months that year. In nearly every child improvement was noted, and in some cures were effected. The improvement was shown in improved appetite, improved attention and general excellence of temperament.

Following the success of this experiment, similar schools were established in various parts of Germany with like success. The children improved in health, kept up in their studies and were eager to attend. The movement has now passed the experimental stage in Germany and become an integral part of the educational system.

England took up the idea in 1907 in the school at Bostall Wood, and this example was followed by other cities in 1908 and 1909. In the United States, Providence was the first city to establish such a school, and it was done by the expedient of removing one wall from a school room, replacing it by windows which could be pulled up quite out of the way. This school was thoroughly successful from the start, the report for the first year stating that all but one child showed marked improvement. Boston, in July 1908, opened a fresh-air school, which is now held on the roof of a large building in Franklin Park. In New York City the first school was in the day camp of the ferryboat *Southfield*, where the children of the camp banded together and demanded a teacher. Chicago began in a large tent; Hartford in a public park, later in a tent; Rochester and Pittsburg have followed suit; and it is now becoming so common a thing to hear of the establishment of open-air schools that someone has paraphrased an old verse to read:—

"Count that day lost whose low descending sun
Sees in our land no outdoor school begun."

The results from these schools have been uniformly excellent, which was to be expected, perhaps, for the principle of fresh-air treatment is not a new one. The general improvement in ruddiness of cheek, brightness of eye and excellence of appetite have been paralleled by gains in weight, in one instance (Bostall Wood) the children averaging a gain of a pound a week for four weeks, with a cessation of gain in weight between periods of attendance. The average hemoglobin estimation of the Providence children rose from 74 per cent. to 84 per cent. during five months' attendance, only to fall to 75 per cent. during three months' vacation. But it has not been on the physical side alone that results have been evident. The remarkable thing has been that these children have not only kept up in their studies, showing increased mental alertness and power of application, but many times have done the work of regular grades, although devoting to school work only half the usual time. The Chicago children loved their school so that they refused to take a vacation during the Christmas holidays.

There are from 3 to 5 per cent. of our children who need the special watching and care, the regulated feeding and outdoor life which these schools afford. No other plan apparently has met so well the need or shows such a hopeful prospect of making feeble children healthy and at the same time educating them. The cost will vary according to conditions, but it has not proved prohibitive. Inexpensive structures, such as portable houses and tents, can be used and roofs of buildings already erected can be utilized advantageously. There seems to be no reason why in all our large cities accommodations could not be arranged to take care of all the children who need such careful supervision. The question comes as a logical sequence, Will not the well children ultimately demand such schools as right for their best development? Perhaps then some day our boys and girls will come home from school rosy and hearty instead of pale and white, and the schools will satisfy, as they do not now, the physician as well as the educator.

ORIGINAL COMMUNICATIONS.

THE VALUE OF LUMBAR PUNCTURE AND OF THE LEUKOCYTE COUNT IN THE DIAGNOSIS OF ACUTE POLIOMYELOENCEPHALITIS (INFANTILE PARALYSIS).

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Various microorganisms have been found by different observers in the cerebrospinal fluid of acute poliomyeloencephalitis. It is safe to say, however, that these microorganisms have been contaminations or accidental occurrences and not the cause of the disease, which in the light of the investigations of Flexner and others is almost certainly caused by an ultramicroscopic organism. It has been believed until very recently that the cerebrospinal fluid in this disease was in every way normal, that it was not under pressure, was clear, did not contain an excess of cellular elements or show a fibrin clot. La Fétra, for example, reports lumbar punctures in 14 cases in the New York epidemic of 1907. The fluid was always clear. In only 1 case were any cells found, and in that only a few mononuclears. He does not state, however, at what stage of the disease the punctures were made. Heiman did lumbar punctures in 6 cases from three to fourteen days after the onset of the disease. In 1 case he states that 30 per cent. of polynuclears were found but does not state the total number of cells. The others "were normal." Wollstein also studied the cerebrospinal fluid, obtained by lumbar punctures done from the second day to the eighth week of the disease, in 20 cases. The fluid was clear and colorless in all, but showed a conical coagulum in about one-half of them after twenty-four hours. No cellular elements were seen in 14 and a very few mononuclear cells in the others. These reports are representative of various others in small series of cases.

Flexner and Lewis studied the changes in the cerebrospinal fluid in monkeys after intracerebral inoculation of the virus and obtained the following results. The fluid obtained by lumbar puncture twenty-four hours after intracerebral inoculations was normal in quantity but contained a considerable number of small cells hardly exceeding a lymphocyte in size, but showing a polymorph nucleus, a few lymphocytes and some red corpuscles. At the end of forty-eight hours the white cells had increased in num-

bers but the cells with polyform nuclei still predominated. At the expiration of seventy-two hours a large number of mononuclear cells had appeared and the fluid was opalescent. On the day of the paralysis the fluid was only slightly cloudy and contained a mixture of large and small (lymphoid) mononuclear cells and a few cells with polymorphous nuclei. These experiments show that the cellular changes in the meninges and cerebrospinal fluid begin immediately after the intracerebral injection and are present several days before the onset of the paralysis.

Lucas also studied the changes in the cerebrospinal fluid in monkeys after intracerebral inoculation with the virus and obtained the following results: During the incubation period there was a marked increase in the amount of the fluid and the number of cells increased from one to two, the number under normal conditions, to from 100 to 300 per cubic mm. These cells were mainly of the large mononuclear type, with some polynuclear cells and lymphocytes. The number of cells often reached 1,000 per cubic mm. in the prodromal stage, the proportion of polynuclear cells being in some cases as high as 60 per cent. The increase in the number of cells was very marked in the early acute stage. At this time, however, the cells were mostly of the lymphocytic, or very early form of cells. The number of cells then began to decrease in number while the proportion of polynuclears increased. There were very few cells present at the end of a week or ten days. There was at times a fibrin clot in the prodromal and early part of the acute stage. The fluid was never under great pressure.

Lucas also examined the cerebrospinal fluid of 4 patients suffering from acute poliomyelitis. They were first seen between the second and fifth days of the disease, when they were still hypersensitive and the paralysis was just appearing. Several examinations were made in each case, the latest being on the twelfth and thirteenth days. Increased pressure was noticed in but 1 case. A fibrin clot was present in 2 cases early, and in 1 of them was still present on the twelfth day. The number of cells in the fluid at the first puncture varied between 50 and 350. In 3 of them it increased slightly later. It was present at the last examination in all of them, the examination in 2 of them being made as late as the twelfth or thirteenth days. The lymphocytes and small mononuclears predominated at the first examinations. At subsequent examinations a portion of these cells were replaced by large mononuclears, and finally polynuclears began to appear, the type

of cells found corresponding with the findings in experimental spinal fluids.

Hough and Lafora studied very carefully the cerebrospinal fluid of 11 patients ill with acute anterior poliomyelitis. The fluid was always perfectly clear but the pressure was slightly increased in most. There was a moderate pleocytosis in 3 cases examined during the first stages of the disease, the highest proportions of polymorphonuclear cells being 18 per cent., 14 per cent. and 4.5 per cent. The polymorphonuclear leukocytes disappeared after the fifth or sixth day of the disease through the phagocytic activity of the macrophages, which latter sometimes contained from ten to twenty or more chromatin bodies, probably remains of the nuclei of the polymorphonuclear leukocytes.

I have more or less complete records of the examinations of the cerebrospinal fluid in a number of cases, some of which were made several years ago at a time when it was supposed that the cerebrospinal fluid in this disease was normal and which are consequently entirely free from bias. The results are shown in the following table:

Case	Day of Disease	Day of Paralysis	Amount of Fluid	Appearance of Fluid	Pressure	Fibrin Clot	Number of Cells per cmm.	Differential Count of Cells
1	2	2	30 c. c.	Clear	?	?	?	A few leukocytes
2	7	7	20 c. c.	Clear	+	Clot	?	A few lymphocytes
	12	12	15 c. c.	Clear	N	No clot	?	?
3	15	10	25 c. c.	Clear	N	Clot	?	Mononuclear, 76% Polynuclear, 24%
	17	12	20 c. c.	Clear	N	Clot	?	Very few—all mononuclear, mostly large
4	5	0	?	Clear	?		35	All lymphocytes
	8	2	40 c. c.	Opalescent	N	No clot	230	All mononuclear
	14	8	?	Clear	?	No clot	10	All lymphocytes
5	2	Encephalitic Type. No Paralysis	25 c. c.	Clear	Slt +	Clot	200	Majority endothelial Occasional lymphocyte Rare polynuclear
6	2	"	?	Clear	Considerable	No clot	360	Mononuclear, 90% Polynuclear, 10%
	5	"	?	Clear	?	?	480	Small mononuclear, 97% Polynuclear, 3%
7	16	"	?	Clear	?	No clot	65	Small mononuclear, 98%
	22	"	?	Clear	?	No clot	75	" " 100%

These examinations are, of course, too few to justify any conclusions. It is noteworthy, however, that the fluid was perfectly clear in all but one instance, in which it was opalescent; that the pressure, while sometimes increased, was more often normal; that there was sometimes a clot and sometimes not; that there was no clot in one instance on the second day, while in another it was still present on the seventeenth day of the disease and the twelfth of the paralysis. There was also a very large excess of mononuclear cells at all stages. These were usually lymphocytes, the proportion in most cases being over 95 per cent. There was no evident tendency to an increase in the number of polynuclear cells with the progress of the disease.

It seems safe to conclude, therefore, from the present data that during the acute stage of acute poliomyeloencephalitis the cerebrospinal fluid is clear and not infrequently under somewhat increased pressure; that it often shows a fibrin clot, which may persist for two or three weeks and perhaps longer; that it always contains an excess of cells; that these cells are chiefly of the mononuclear type, most of them being lymphocytes; and that these changes are present before the appearance of the paralysis. These changes are, however, identical with those found in tuberculous meningitis, the disease with which it is perhaps most likely to be confounded. It is true, of course, that the cerebrospinal fluid in tuberculous meningitis contains tubercle bacilli. They are missed in about 90 per cent. of the cases, however, if the examination is the usual routine one. If tubercle bacilli are found in the cerebrospinal fluid, the diagnosis of tuberculous meningitis is, of course, positive; if they are not found, the examination of the fluid is of no assistance in the diagnosis between tuberculous meningitis and acute poliomyeloencephalitis. How difficult this diagnosis may be and of how little assistance is the examination of the cerebrospinal fluid is shown by the following cases:

Helen D., five years old, began to complain of headache and chilliness the night of September 14th. This was soon followed by fever, which continued. She was thoroughly cleaned out, but this had no effect on the symptoms. She became dull and sleepy on the 15th and more so on the 16th. She began to complain of pain in the spine on the 16th, which increased rapidly in severity so that she screeched when moved. She was seen at 10:30 P.M. on the 16th.

She was well developed and nourished and partly comatose.

She cried out shrilly when moved, if the movements involved the spine. Her neck was held rigidly. There was intermittent external strabismus. The pupils were dilated, but were equal and reacted to light. The left knee-jerk was always present, the right was sometimes present and sometimes absent. When present, it was always sluggish. She did not move her right leg as much as the left. Kernig's and Babinski's signs were absent. The rest of the physical examination showed nothing abnormal.

Twenty-five c.c. of clear fluid under slight pressure were obtained by lumbar puncture. A fibrin clot formed in a few hours. This fluid contained 200 cells to the cubic mm. The vast majority of these cells were of the mononuclear type, lymphocytes being occasional and polynuclears rare.

The leukocyte count was 16,000.

She was a little clearer mentally the next day and there was a slight paralysis of both legs. The story from this time on was that of acute poliomyeloencephalitis.

Robert K., two and three-quarter years old, fell downstairs August 3d, striking his head. He was apparently not hurt in any way, but began to vomit early in the morning of August 4th. He continued to vomit all that day and his bowels did not move. He became delirious in the early morning of August 5th. He was seen at 2 P.M., August 5th.

He was somewhat irrational but noticed a little. The pupils were equal and reacted to light. There was no rigidity of the neck and no neck sign. There was no spasm or paralysis. The knee-jerks were equal and normal. Kernig's and Babinski's signs were absent. The rest of the physical examination showed nothing abnormal.

A clear fluid under considerable pressure was obtained by lumbar puncture. It showed no fibrin clot after twenty-four hours and contained 360 cells to the cubic mm. 90 per cent. of these cells were mononuclear and 10 per cent. polynuclear. No organisms were seen. He was nauseated and restless August 6th. The pupils were equal and reacted to light. There was no strabismus or nystagmus. There was no rigidity of the neck, but the neck sign was present. The knee-jerks were equal and lively. Kernig's and Babinski's signs were absent. There was slight rigidity of the neck August 7th. The knee-jerks were present but diminished. There was a suggestion of Kernig's sign on the left. A skin tuberculin test on this date was positive.

He recognized his parents August 8th and said a few words. The pupils were equal and reacted to light but there was marked photophobia. The knee-jerks were equal and normal. There was no spasm or paralysis. Kernig's sign and the neck sign were absent, there was no rigidity of the neck, the abdominal and cremasteric reflexes were not obtained.

Lumbar puncture gave a clear fluid which contained 480 cells to the cubic mm., many of which were degenerated; 97 per cent. of these cells were small mononuclear and 3 per cent. polynuclears. No organisms were seen.

The blood contained 10,000 leukocytes.

Recovery began the next day and was complete.

Edna D., two and one-half years old, lived with her father for three months previous to his death from tuberculosis two years before. She had, however, always been well. She vomited and had a general convulsion October 11th. The convulsion was followed by twitchings of the extremities, most marked in the right hand, which lasted for eight hours. They had continued intermittently since then. She had been unconscious since the onset. She was seen at 1 P.M., October 15th.

She was in good general condition and of good color. She was dull and took no notice. There were frequent convulsive movements of the right arm and occasionally slight opisthotonos. There was no retraction or rigidity of the neck. The pupils were equal and reacted to light. There was no strabismus or nystagmus. There was slight spasticity of all the extremities, most marked in the left arm. There was no paralysis. The knee-jerks were active. There was no clonus, and Kernig's, Babinski's and the neck sign were absent.

Thirty-five c.c. of clear fluid were obtained by lumbar puncture. It contained thirty-five cells to the cubic mm., all of which were lymphocytes. No tubercle bacilli were found and cultures were sterile.

The blood showed 34,600 leukocytes.

A tuberculin skin test was positive.

Paralysis of the left arm appeared the next day and soon extended to the legs. The course of the disease from this time on was perfectly characteristic of acute poliomyelencephalitis.

Robert C., two and one-quarter years old, had always been well. There had been no known exposure to tuberculosis. He began to grow "dreamy" about August 15th. He vomited once or

twice in the beginning and lost his appetite. He had had two or three movements from the bowels daily, which were loose but otherwise normal. The chief symptoms were increasing weakness and dullness. He had had no convulsions. He was seen August 29th.

He was poorly nourished and moderately pale but did not look sick. He was very quiet and took very little interest in anything. The pupils were equal and reacted to light. There was no strabismus or nystagmus. There was no spasm or paralysis. The kneejerks were absent. Kernig's, Babinski's and the neck sign were absent and there was no clonus. The rest of the physical examination showed nothing abnormal.

Lumbar puncture, August 31st, gave a clear fluid which showed no fibrin clot but contained sixty-five cells to the cubic mm., 98 per cent. of which were small mononuclears. No organisms were seen.

A skin tuberculin test was positive September 1st.

During this time he had lain perfectly quiet and had apparently taken no interest in his surroundings. He was brighter September 5th, sat up in bed and asked for playthings. He was able to answer simple questions intelligently. Voluntary muscular movements and coördination were normal. The tendon reflexes were normal. There was no neck sign or clonus. Kernig's sign was absent. The pupils were equal and reacted to light. He improved gradually but steadily from this time on and never developed any paralysis.

The characteristics of the cerebrospinal fluid in the early stage of acute poliomyeloencephalitis are so different from those in the early stage of cerebrospinal meningitis—in which the fluid is turbid or purulent, contains a large number of polynuclear cells and, as a rule, numerous meningococci—that there is no possibility of confusing them. Lumbar puncture is, therefore, of the greatest assistance in differentiating between these two conditions. It is of equal value in distinguishing acute poliomyeloencephalitis from influenzal and pneumococcal meningitis and from the meningitides due to the pus organisms.

The changes in the cerebrospinal fluid in the early stage of acute poliomyeloencephalitis are so definite that when they are found it is possible to exclude all diseases outside of the meningitides. Lumbar puncture, therefore, provides a most valuable means of diagnosis in this disease. Unfortunately, there is noth-

ing whatever characteristic about the early symptoms of acute poliomyeloencephalitis and in order to recognize the disease early, before the onset of the paralysis, at a time when treatment might possibly be of some value, it would be necessary to do a lumbar puncture on every sick child. This hardly seems a rational procedure. Treatment can do no good after the appearance of the paralysis, because the harm is then already done. Lumbar puncture at this time simply makes possible the verification of the clinical diagnosis. The value of lumbar puncture in the early diagnosis of acute poliomyeloencephalitis is, therefore, very limited, in spite of the marked changes in the cerebrospinal fluid in this disease.

There is a considerable amount of scattered data as to the leukocytes in acute poliomyeloencephalitis. Some have found a diminution in the number of cells, others a considerable excess, others have obtained no constant results. Heiman, for example, found a minimum of 5,000, a maximum of 23,000, and an average of 13,000. La Fétra, in 6 cases, found a variation between 13,400 and 20,600. Neither state the duration of the disease at the time of the examinations of the blood.

Lucas, in his experimental work with monkeys, found that the number of white cells did not change during the incubation period, although sometimes there was a marked or moderate drop in the white count during the irritative or prodromal stage. There was always a marked drop during the acute stage, the lowest count being on the second day after the appearance of the paralysis, the diminution in some cases being as much as 50 per cent. There was also a lymphocytosis during the acute stage. He counted the leukocytes nine times in 4 patients, the earliest count being made on the second, the latest on the thirteenth day. The number of leukocytes varied between 7,800 and 17,400. The lowest count was on the seventh day, the highest on the fifth day. There was nothing constant in the relative proportions of the leukocytes, although in some instances there was a relative lymphocytosis.

I have records of the leukocyte count in 9 cases. These are shown in the following table:—

Day of Disease.	Day of Paralysis.	Leukocytes.
2	2	11,200
3	Encephalitic type; no paralysis.	16,000
5	Encephalitic type; no paralysis.	10,100
6	6	14,000
7	1	34,600

Day of Disease.	Day of Paralysis.	Leukocytes.
7	7	18,400
15	10	16,800
16	16	19,700
19	12	16,200

It is noticeable that there was never any diminution in the number of white corpuscles but usually a moderate or marked leukocytosis. It is also noteworthy that the most marked leukocytosis occurred on the day on which the paralysis appeared. Unfortunately no differential counts of the white cells were made.

It seems evident, therefore, that the leukopenia which occurs in animals during the early part of the acute stage is certainly not a constant symptom in man and that in many instances it is replaced by a hyperleukocytosis. At present, therefore, the conclusion is justified that the leukocyte count is of little or no assistance in the early diagnosis of acute poliomyeloencephalitis. There is at present not sufficient evidence to show whether or not there is a relative or absolute lymphocytosis in the early stages. If further investigation shows that this is a fairly constant phenomenon, it should be of considerable assistance in the early diagnosis.

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SIGNIFICANCE OF THE CUTANEOUS TUBERCULIN REACTION IN INFANCY.—L. Cohn (*Berlin. klin. Woch.*, October 3, 1910). The principal value of the cutaneous tuberculin reaction consists in its diagnostic and prognostic significance in tuberculosis of the nursling. The positive result of the test has no value in older children and adults; the negative result does not definitely exclude tuberculosis when the patients are emaciated and cachetic. Below the third month the reaction is always negative. The tuberculous infection ensues mostly at a very early period of the child's life. It occurs decidedly earlier in children of tuberculous families than when the parents are non-tuberculous. An unfavorable prognosis must be entertained when an infection with tuberculosis takes place in the nursling. Of 18 children which were infected during the first year of life 16 died.—*Archives of Diagnosis*.

A CLINICAL STUDY OF 86 CASES OF EMPYEMA IN CHILDREN.*

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In the discussion of empyema in children, the subject must be regarded from two viewpoints—medical and surgical.

Empyema, as observed by the surgeon, differs in many respects from the empyema met with by the general practitioner. The surgeon, as a rule, sees the case late; the family physician, on the other hand, meets the condition early. The cases observed by the surgeon are, so to speak, limited or selected, including, as a rule, only such as have passed the acute stage, and its incidental dangers. The complications have been weathered and the lesion is confined to a purulent collection in one or other pleural cavity.

True, many of the subacute cases coming under surgical care show loss of flesh and strength, are anemic and cachectic, with sallow complexions, and run a more or less septic temperature, with or without diarrhea. Even under such unfavorable conditions the prognosis is favorable.

The practitioner sees a large number, in which various complications exist. Suppurative pleurisy, we must not forget, is only one factor in the infection caused by the pneumococcus or other organism.

Pneumonia, single or bilateral, pericardial and myocardial involvement, meningeal symptoms, single or multiple abscess of lung, gangrene and meningitis are some of the attending conditions met with in the early stages of the disease. The severe constitutional evidences of infection, as convulsions, apathy, even coma, weak pulse, high temperature and typhoid state, add to the dangers in the first week or two. Primary empyema is relatively infrequent. The mortality is high during the early stage because of the various complications referred to above. The clinical course of empyema in infants is short and critical. The postmortem records of Bovaird show that some of the cases die within forty-

* Read by title at the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May 3, 4 and 5, 1910.

eight hours after invasion, that the greater number of the 69 cases studied by him proved fatal within a week, but few lived longer than two weeks. This phase of the subject must not be lost sight of when the general subject of empyema in childhood is considered. The statistics of the general practitioner, as they include the various types, consequently present a higher mortality.

The affection is much more common in the young, and, unfortunately, more fatal, as the various hospital records show. The prognosis is less favorable, for above-mentioned reasons, in the acute than in those running a subacute course. The outcome depends not only upon the general condition and the surroundings, but also to a great extent upon the presence of complications, the character of the underlying process, the nature of the organism and the degree and intensity of the infection.

Elaborate charts, in the preparation of which I was materially assisted by Drs. S. D. Ehrlich, Harry Cohen, S. Horwitt and S. Ginsberg, giving name, date of admission, and discharge, sex, side involved, age, blood counts, bacteria, urinary examinations, primary operation, secondary operation, recovery, death, complications and remarks, are omitted for lack of space. The main facts are tabulated and presented below.

From January 1, 1908, to January 1, 1909, 35 cases were observed in the children's service at Beth Israel Hospital. As there were 468 children under twelve years of age admitted, the proportion of empyema was about 1 to 13½.

TABLE OF CASES IN 1908 (TABLE NO. I.).

Age.	Male.	Female.	Right.	Left.	Recovery.	Death.	Improved.	Incision.	Resection.	Secondary Resection.
5 months	1		1		1			1		
6 "		2	2			2		2		
8 "	2		2		1	1		2		
9 "		1	1		1				1	
10 "	1			?	1			1		
11 "	1		1			1		1		
1 year	1	1	2		1	1		1	1	
14 months	1		1		1		1	1		
15 "	2			2	1	1		1	1	1
20 "	1	2	1	2	3			3		
21 "	1		1	1	1			1		1

Age.	Male.	Female.	Right.	Left.	Recovery.	Death.	Improved.	Incision.	Resection.	Secondary Resection.	
2 years	3	I	3	?	4			4		I	I not operated
2½ "	3	I	I	3	3	I		4			
3 "		4	2	2	3			3			
5 "	2			2	2			2		I	
5½ "		I		I	I			I		I	
6 "	I		I		I				I		
8 "		I		I	I			I			
10 "	I		I		I			I		I	
20 | 15 | 20 | 13 | 27 | 7 | I | 30 | 4 | 6 | I Two not noted.											

FATALITY IN 1908 (TABLE NO. II.)

No.	Age.	Male.	Female.	Right.	Left.	Cause of Death.
2	6 months		2	2		Dora N., erysipelas.
I	8 "	I		I		Dora P., bronchopneumonia.
I	II "	I		I		Toxemia, two days after admission.
I	I year		I	I		Gastroenteritis.
I	15 months	I			I	Bronchopneumonia and abscess of lung.
I	2½ years	I			I	Erysipelas.
						Gastroenteritis.
Total 7		4	3	5	2	

From the above we find that the mortality was greater in cases in which the right side was involved.

Admitted during	January, February, March....	10
"	" April, May, June.....	16
"	" July, August, September....	3
"	" October, November, December	6

Total 35

As is evident from inspection of Table I 21 were two years of age and under, of which 10 were a year old or less.

One child was admitted on the fifth day of the illness, 1 on the

eighth day, 1 on the twelfth; 4 had been ill two weeks and the remainder for longer periods.

During the year 1909 the number of cases was greater, the patients were admitted earlier in the course of the disease with a severer type of infection, a most interesting exemplification of the well-known fact of the variation of type in different years.

TABLE OF CASES IN 1909 (TABLE NO. III.).

Age.	Male.	Female.	Right.	Left.	Recovery.	Death.	Improved.	Incision.	Resection.	Secondary Resection.	
8 weeks	I			I							refused operation
11 "	I		I			I		I			
4 months	I			I		I		I			
4½ "	I		I			I		I			
5 "	I	I	2		I		I	2			
7 "	3		I	2		3		3			
8 "	3		2	I	I	2		3			
9 "	2		I	I	I	I		2			
10 "	I	I	I	I		2		I			
1 year	I			I	I			I			I puncture and drainage
14 months		I		I	I			I			
15 "	2		I	I	2			2			
16 "		I		I	I			I			
17 "		I	I				I	I			
18 "		I		I		I		I			
19 "	2	I	3		3			3			
20 "	I	I	I	I		I	not	2			
2 years	4	I	3	2	4	I		5		2	
2½ "	2			2	I	I		2			I puncture and drainage
3 "	I	2	I	2	2	I		2	I		
3½ "	I	I	I	I	I					I	
4 "	I	2	3		2	I		3		I	
5½ "	I	3	4		3	I	•	2	I		
6 "	I		I		I			I			
8 "	I			I	I				I		
9 "	I			I	I			I			
9½ "		I		I	I			I		I	
10 "	I		bilateral			I			I		
Total	34	17	28	22	28	19	3	44	4	5	2

I bilateral. I not operated. 3 improved.

FATALITY IN 1909 (TABLE NO. IV.).

No.	Age.	Male.	Female.	Right.	Left.	Remarks.
1	11 weeks	1		1		Staphylococcus aureus infection.
1	4 months	1		1		Abscess of lung and bronchopneumonia; died 4 days after operation.
1	4½ "	1		1		Lateral pharyngeal abscess; erysipelas of face; streptococcal infection.
3	7 "	3		1	2	Benny K., bronchopneumonia and abscess of lung. Julius R., died 4 days after operation. Staphylococcus aureus infection. Isie L., bronchopneumonia and sepsis.
2	8 "	2		2		Isie K., death within 24 hours after admission. Isie L., death within 24 hours; pneumonia and sepsis.
1	9 "	1		1		Bronchopneumonia.
2	10 "	1	1	1	1	Rosie P., diphtheria and erysipelas. Max B.
1	18 "		1		1	
1	20 "		1		1	Rosie M., W.B.C. 40,000; poly, 80 per cent.; streptococcal infection; death 9 days after operation.
1	2 years	1		1		Bronchopneumonia, enterocolitis, septic purpura.
1	2½ "	1			1	Bronchopneumonia and pericarditis.
1	3 "	1		1		Gangrene of middle lobe.
1	4 "		1	1	1	Bronchopneumonia, erysipelas, acute suppurative pericarditis.
1	5½ "		1	1		General pneumococcal infection.
1	10 "	1		bilateral		Pyopericarditis.
Total 19		14	5	12	6	

Admissions, 1909, according to seasons, as follows:—

January, February, March 10 cases

April, May, June 17 "

July, August, September 9 "

October, November, December 15 "

Total 51 "

Duration of illness: 25 were sick two weeks or less as follows:—

Ill 2 weeks 11 cases

Less than 2 weeks 14 "

1 admitted third day of illness; 2 on the fourth day, 1 on fifth day, 1 on sixth day, 3 on seventh day, 2 on eighth day, 2 on tenth day, 1 on twelfth day and 1 on thirteenth day.

Comparing 1908 and 1909 we find that in 1908, of 468 children under twelve years admitted there were 35 empyemas, a proportion of about 1 to 13 $\frac{1}{3}$. In 1909, of 499 admitted, 51 were empyemas, practically 1 to 10.

In 1908, 20 males and 15 females; right, 20; left, 13.*

In 1909, 34 males and 17 females; right, 28; left, 22.

In 1908, 21 were two years of age or under, of which number 10 were one year old or less.

In 1909, 33 were two years of age or under, of which 17 were one year or less (one-third of the total number).

In 1908, 7 cases had been ill two weeks or less. In 1909 the number was 25—a marked contrast.

In 1908 we lost 7, 4 males and 3 females. In 1909 the mortality was 19, 14 males and 5 females. In both years the mortality was greater in males.

Right-sided cases gave a larger mortality—thus in 1908 it was 5 right and 2 left; in 1909, 12 right and 6 left.

In institutions in which strict isolation cannot be carried out, epidemics of infectious diseases will take place. Thus in the early part of 1908 an epidemic of measles broke out and 6 of our empyemas were affected. In addition, they showed Klebs-Loeffler bacilli without clinical manifestations, in cultures taken from the nose and throat. Fortunately there was no fatality, a circumstance which I attribute to the devotion and attention given to the patients by Dr. W. G. Wulfahrt, in charge of the isolation ward at the time.

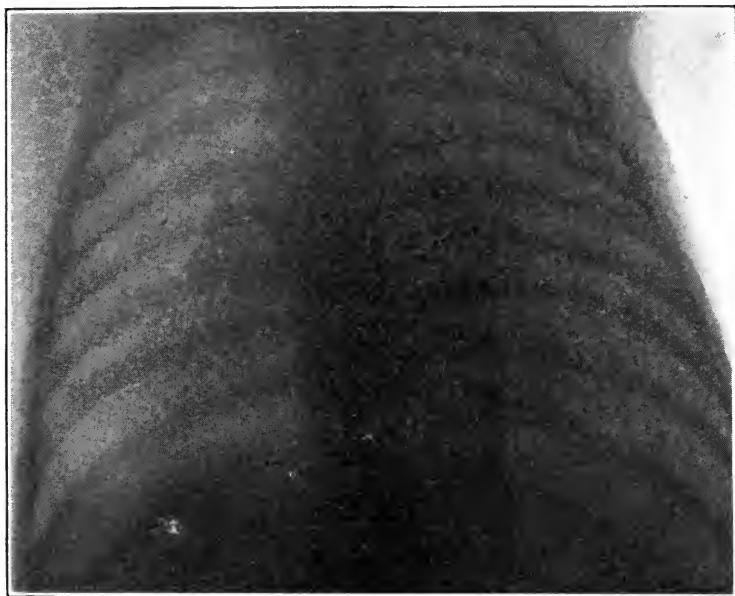
Cases of more than passing interest are briefly referred to below:—

A case of empyema and purpura, treated in the service, has already been reported in the ARCHIVES OF PEDIATRICS, November, 1908.

In the case of Jos. B., six years of age, a rib resection was followed twenty-four hours later by symptoms closely resembling peritonitis. There was marked depression, prostration with copious vomiting, decided pain with tenderness and pronounced distension of the upper half of the abdomen. As the vomitus was copious, yellowish at first and later on greenish, with a foul odor and larger in amount than ingested, Dr. H. M. Silver, who kindly saw the case with me, suggested an acute dilatation of the stomach. Lavage, repeated several times, relieved the distressing symptoms in a short time. Further course uneventful.

* In 2 cases, the history failed to state the side involved.

Physical Signs.—It is not deemed necessary in this discussion to dwell upon the physical signs in detail. Flatness, increased resistance to the percussing finger, absent or diminished breath sounds or distant breathing* (frequently bronchial in type), are characteristic, particularly with a displaced heart.† The displacement is greater in left-sided effusions, because of the normal position of the heart to the left.



Edith S., admitted April 27, 1910. Operated April 28th. Fifteen months old. Right empyema, rib resection; ill five weeks. Blood count, 22,000; 66 per cent. polynuclears. Recovery.

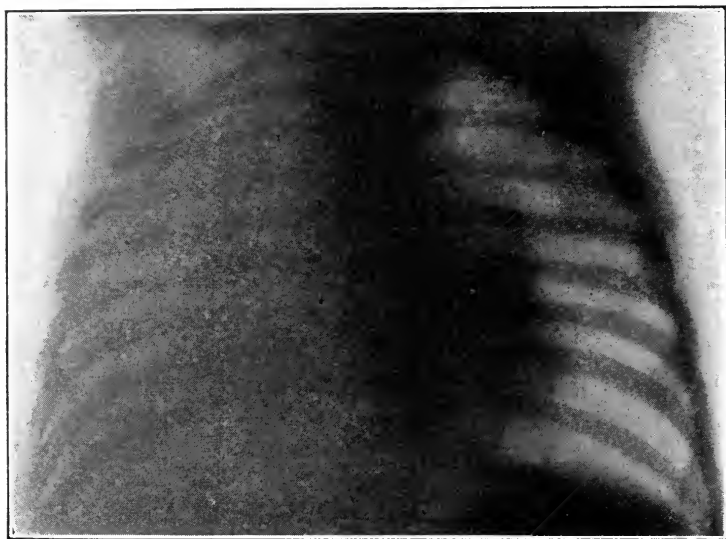
Displacement of the heart is a most important sign in the differential diagnosis. The position of the visible impulse is to be noted, whether to the right or left of the sternum; if behind the bone it cannot be appreciated. At times, however, the impulse may be evident just below the ensiform cartilage. Palpation may aid when the impulse cannot be made out by inspection. In many instances auscultation must be resorted to in order to locate the apex beat.

* The importance of a recognition of "the sense of resistance in diagnosis" is emphasized in an editorial in the *Medical Record*, June 4, 1910, which has appeared since the writing of this article.

† The breathing may be loud and bronchial over a purulent effusion. The "board like feel" and displaced heart will aid in a correct interpretation of the findings.

Fluoroscopic examinations give positive and valuable information. With the aid of the screen we frequently find unsuspected pulmonary consolidation in addition to the effusion.

The books tell us that the affected side is more prominent with wider intercostal spaces. In cases of large effusions and of long standing, this may be true. In the greater number the intercostal spaces, on the contrary, are narrowed and the side is retracted.



EMPYEMA (LEFT).

Morris P., fifteen months, admitted February 12, 1908, had measles four months ago, followed by pulmonary complication and cough for two months. Lost considerable flesh; became very pale.

Twelve days ago ran up temperature and began to cough again; was quite prostrated; pneumonia diagnosed; improved in five or six days, to again relapse. Taken to dispensary. Empyema diagnosed.

Rachitic chest. Left side posteriorly, from angle of scapula to base, marked dullness, diminished breathing, distant bronchial fremitus and voice. Above breathing bronchial, numerous moist râles. Anteriorly, dullness and diminished respiratory sounds.

February 12th, white blood corpuscles, 14,400; polynuclears, 68 per cent.

February 13th, exploratory puncture negative.

February 17th, exploratory puncture negative.

February 19th, nose and throat culture positive. Isolated.

February 23d, white blood corpuscles, 20,000; polynuclears, 78 per cent.

February 27th, rib resected in axilla.

Diminished negative pressure within the thorax may account for the lessened normal depression of the intercostal spaces. Because of the pain, the affected side is favored. The approximation of the ribs in the early stages may be attributed to the spasm of the intercostals, analagous to the reflex muscular contraction observed in joint disease. At the same time a marked resistance to pres-

sure is met with in the interspaces. Narrowing of the intercostal spaces and scoliosis (with the convexity toward the unaffected side) have been observed even with large effusions three to four weeks from the onset of the trouble. Compensatory emphysema of the other lung further tends to accentuate the disproportion. The X-ray studies emphasize these points in a striking manner.

The absorption of the liquid portion of the exudate in chronic cases gives rise to a retraction of the side involved, with more or less deformity.

Though numerous bacteriologic studies have been made, we are not in a position at present to separate empyema into sharply-defined groups corresponding to the bacterial findings. In 36 cases in our series pneumococci occurred nineteen times, staphylococci eight and streptococci nine. Other writers give a higher percentage of pneumococcus infection; no doubt our own tables would have presented a larger number if the results of the examinations had been recorded. The organism shows a marked tendency to die out. Thus, in a case recently observed, no organism was found at the time of operation, about the twentieth day of the disease. In not a single instance did we find tubercle bacilli.

Pyocyaneus contaminations occurred rather frequently, always as a secondary ward infection. Mixed infections were only noticed with putrid exudates. The relation of the pleura to the deeper portions of the respiratory tract (where mixed infections are less frequent) is advanced to explain the limited number or, rather, varieties of organisms giving rise to empyema. Pneumococci were usually discovered in those cases in which large fibrin masses existed in the turbid or purulent fluid.

Text-books speak of primary and secondary types of empyema; in practice, however, it is not always easy or possible to assign cases under one or other category. Pleurisy, it must be remembered, is nearly always secondary to disease in neighboring organs, particularly the lungs. Primary empyema is said to be more common in children. The question is not easily settled. The presence of fluid may obscure underlying pulmonary conditions, while the absence of sputum adds to the difficulty. Fluoroscopic examination not infrequently reveals areas of pulmonary consolidation not detected on a physical examination.

Bovaird, who has carefully studied 101 fatal cases at the New York Foundling Asylum, writes: "The number of cases in which the lung presented no lesion, but compression (35 per cent.),

is striking. Nor will it do to explain away this high percentage on the hypothesis that a pulmonary lesion had been present before the empyema, but had resolved before death. The great majority of these cases have been so acute and fatal within such brief periods (even two to three days) that we must believe that the conditions found at autopsy were substantially those present during life."

In our experience primary empyema is not nearly so common, probably not more frequent than 1 in 10. A plausible explanation of this discrepancy is that our cases do not include the very early type (two, three and four day cases).

Secondary empyema may follow pneumonia (either catarrhal or lobar), pulmonary tuberculosis (less frequent in children), and abscess or gangrene of the lung. In none of our cases was there a history of trauma. In a few suppurative otitis was present. In 5 erysipelas attended or preceded the trouble. (One of these with vaccination.)

Gangrene leads to putrid exudates. In 3 cases under our observation the odor was not present at the time of operation. In fact, it was not observed until several days had elapsed.

Sarah M., aged fourteen months, admitted May 30, 1909, and Dora M., four and one-half years, admitted April 7, 1908, both presumably with ordinary empyema, a few days after operation developed a foul odor from the wound. When careful irrigation was resorted to a paroxysmal cough followed, and when a weak peroxide solution was employed a frothy fluid was coughed out, showing a communication with a bronchus. The younger child recovered in about six weeks. The older patient was left with a pulmonary fistula, which, after a number of months, finally closed.

Secondary types have been observed after scarlet fever, measles, whooping-cough, multiple furunculosis and marasmus. In one case, after a severe burn, observed a few years ago, a double empyema developed subsequently.

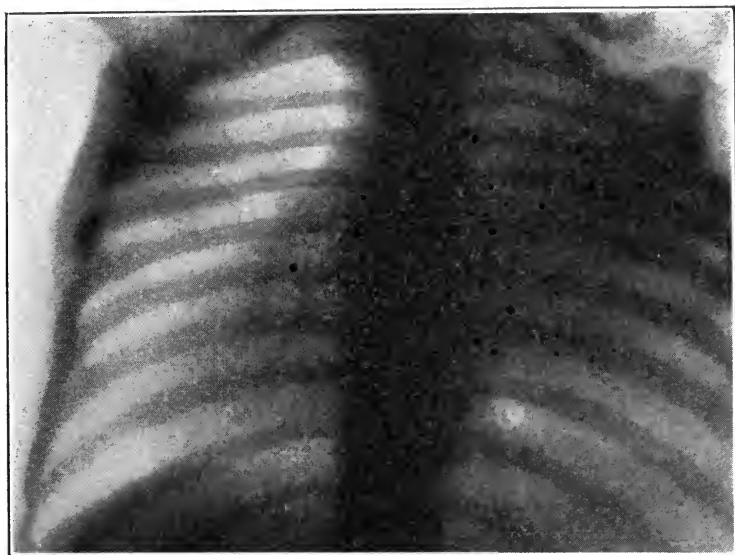
Encysted empyema is not infrequent. The maintenance of one position during the development of the process influences the location of the effusion. If the patient be kept in a dorsal decubitus, the fluid is usually confined to the lateral and posterior regions of the affected pleura; if kept lying on the side a corresponding limitation may be observed.

In the 101 fatal cases studied by Bovaird, he found that, "as a rule, a part, not the whole, of the pleural sac is involved in any

given case. Usually it is the pleura covering the lower lobe that is inflamed."

The cases reported below illustrate some of the conditions referred to above:—

Nathan S., four and one-half months old, admitted October 7, 1909, died four days after operation. A small abscess of the lower lobe of the right lung was found in addition to an extensive pneumonia.



EMPYEMA (RIGHT) LOCALIZED.

Elsie S., twenty-one months, admitted February 13, 1908. Five weeks ago, fever, rapid pulse and cough. Temperature high for about twelve days, when it dropped to normal by crisis.

Temperature remained normal for a short time; then began to fluctuate daily between 100 and 105° F. No great dyspnea, cyanosis or prostration during the disease. Pleuropneumonia (right).

February 13th, white blood corpuscles, 21,000; polynuclears, 81 per cent.

February 27th, exploratory puncture negative posteriorly.

February 28th, exploratory puncture positive in axilla.

February 29th, operated (resection). Recovery.

The case of Benny K., seven months of age, of pyopneumothorax, is merely referred to, as a more detailed report has appeared in the ARCHIVES OF PEDIATRICS, April 10, 1910.

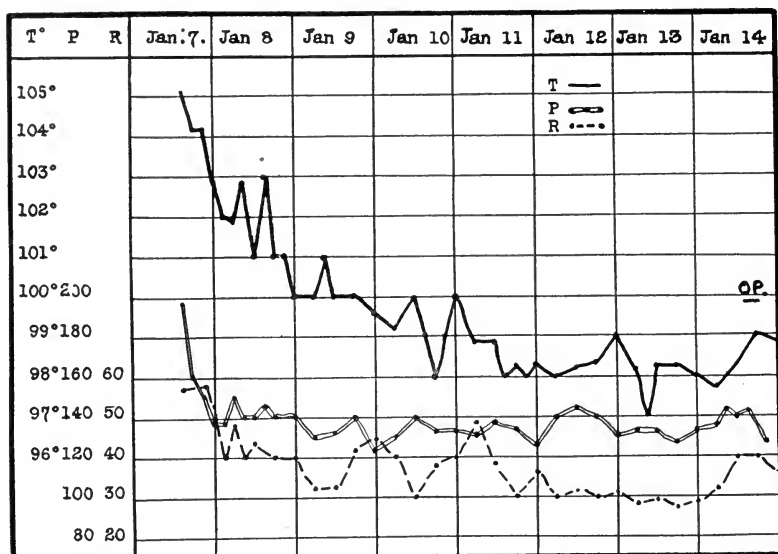
Yetta K., five and one-half years old, admitted September 27, 1910, with a pyopneumothorax probably following an exploratory puncture before admission, is briefly discussed in the same article.

Annie A., nine years old, admitted on the eighth day in a comatose state, delirious, restless, weak pulse, dry, brown, heavily-

coated tongue and sordes on the teeth and gums. Temperature, 104° F.

As the outcome was not promising, the chest was aspirated and irrigated with a weak solution of formalin; alcoholic and other stimulation was resorted to. A few days later, simple incision was done, followed by a rib resection subsequently. Recovery.

Not less interesting and instructive was the case of Archie S., nine years of age. The empyema developed during the course of



EMPYEMA POSTPNEUMONIA (LEFT SIDE).

Isaac Z., fifteen months old, admitted December 29, 1909. December 24th, sudden onset with fever, cough and dyspnea. On admission: Left lower lobe dullness, bronchial breathing, râles and increased fremitus. Course, see "T" Chart. Decline gradual to January 3d; process now extended upwards (irregular "T" to January 8th). Though fever less, child did not rally. January 15th, extensive effusion (Skoda resonance obliterated). Exploratory puncture negative posteriorly, pus found laterally. Pneumococci present. January 18th, incision and drainage (large amount of pus and fibrin escaped). Recovery.

December 29, 1909, white blood corpuscles, 19,600; polynuclears, 88 per cent. January 8, 1910, white blood corpuscles, 19,000; polynuclears, 67 per cent. January 16, 1910, white blood corpuscles, 24,000; polynuclears, 78 per cent.

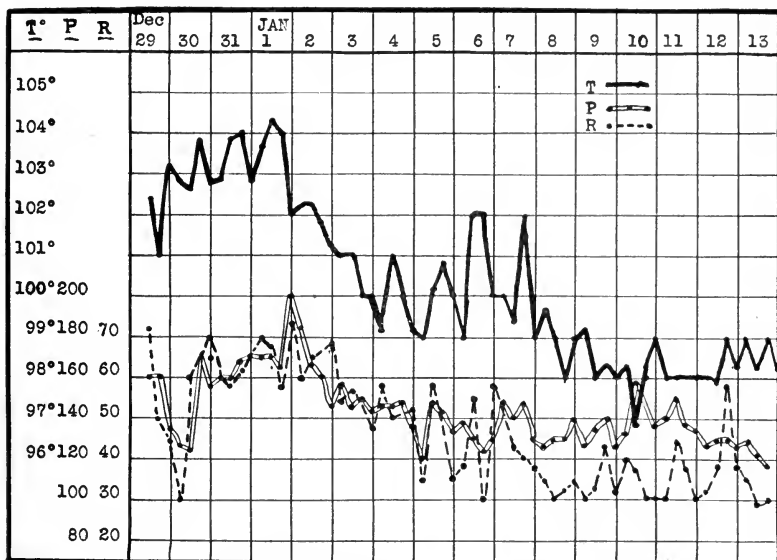
measles. His condition was desperate at the time of admission. He was aspirated, and a few days later a thoracotomy was done. Further progress favorable.

In the following case there had been a coincident meningitis:—

Alex R., two years old, admitted April 2, 1909, in coma; pupils dilated and not responsive; head would fall in any direction (due to loss of muscular tone). The condition resembled that of a

chronic hydrocephalus. Duration of trouble, about four weeks. The chest was incised; condition desperate for weeks. A lateral pharyngeal abscess subsequently developed and was opened. Was later sent to the Seaside Sanitarium. Under the more favorable conditions the patient gradually regained strength, the mental state improved, and, on his return to the city in the fall, he was able to walk, talk and recognize objects.

The symptoms in the acute cases are not distinctive. An apparently frank pneumonia terminates by crisis or lysis; the child,



PRIMARY EMPYEMA (RIGHT SIDE).

Lena S., two-and-one-half years old, admitted January 7, 1910, came in on the eighth day of the disease in a desperate condition; 200 c.c. clear serous fluid withdrawn to relieve the dyspnea. Improvement. January 11th, exploratory puncture revealed yellow turbid fluid. January 12th, pneumococci found in fluid with 90 per cent. polynuclear cells.

January 8th, white blood corpuscles, 9,600; polynuclears, 70 per cent.

January 10th, white blood corpuscles, 28,000; polynuclears, 72 per cent.

January 14th, white blood corpuscles, 22,000; polynuclears, 74 per cent.

January 14th, operation (simple incision and drainage). Recovery.

however, does not rally; upon physical examination, a more or less extensive effusion is discovered. The temperature, on the other hand, may continue and assume an irregular type. In some cases, though the onset may have been severe, the subsequent course after the eighth or tenth day or later is mild. Little or no dyspnea is noticed as long as the child is not excited; the condition is remarkable, in view of the fact that the chest may be full of pus. As a practical illustration, the above *charts* are introduced.

In the further course there is loss of strength and flesh, with more or less prostration. The patients become anemic- and cachectic-looking. The superficial veins over the affected side are enlarged and prominent. Respiration and pulse are accelerated.

Clubbing of the fingers is generally a late manifestation. The skin may be shining and smooth from obliteration of the normal furrows and depressions. Edema of the skin is not very common, and is usually a late manifestation. On the other hand, edema of the affected side may occur early in infants. The displacement of the heart and liver is found to be relatively greater in purulent cases, probably due, as Senator suggests, to the greater weight of the purulent effusion.

Relapse or recurrence of an empyema is not of frequent occurrence. Incomplete absorption or evacuation of the pus and disintegrated fibrin may be followed by symptoms which lead us to suspect a return of the fluid.

Insufficient drainage or the too early removal of the drain, encapsulation or undiscovered pockets and the imperfect expansion of the lung may lead to a further accumulation of pus. In a few instances, local necrosis of the ribs leads to a recurrence.

Pryor (*New York Medical Journal*, December 21, 1907) writes: "The fact that empyema may recur years after recovery has not received the attention it deserves. It seems to be a very rare affection." The subject has been discussed by the writer in *THE ARCHIVES OF PEDIATRICS*, July, 1908, and additional cases were reported.

Perforation of the lung, thoracic walls, diaphragm, or esophagus, did not occur in any of our cases. Pericardial and mediastinal infections were fairly common, though frequently overlooked. Metastatic abscesses elsewhere were seen now and then. Pockets of pus may keep up the temperature and lead to a fatal termination.

Amyloid changes were not observed, nor did we have a single case of pulsating empyema.

The accidents which may follow exploratory puncture or aspiration have been fully considered in a former article (*ARCHIVES OF PEDIATRICS*, March and April, 1910), and need not concern us here.

In the fatal cases, which we have been able to study by "inspection of the wound" or exploratory punctures of the pericardium and spinal canal, other organs were involved in every in-

stance. We have found extensive lobar or bronchopneumonia, single or multiple abscesses of the affected side, and sometimes of the other lung as well, pericardial involvement or turbid fluid in the spinal canal. Parenchymatous degeneration of the liver, kidneys and heart were frequent findings.

Erysipelas, starting in the wound and spreading rapidly, contributed to a fatal end in 3 cases. In 1 case gangrene of the middle lobe was found at autopsy. The history in brief is as follows: Max T., aged three years, admitted April 14, 1909. Measles seven weeks before. Three weeks later pneumonia, with apparent recovery on the twelfth day. After a few days again taken ill and then sent to hospital with diagnosis of empyema. Thoracotomy same day, sixteenth, rib resected. On the eighteenth, four days after operation, first noticed the gangrenous odor to the discharge. Death April 21st.

Careful urinary examinations were made in our cases. At times traces of albumin and a few hyalin casts were present, findings explained by the fever, toxemia or, now and then, the result of stasis.

In a few instances, in patients with diphtheria or erysipelas, a complicating nephritis was present.

Blood studies made in the majority of cases, though of scientific interest, did not assist us materially from the clinical standpoint. They were of but little value in diagnosis or prognosis. The white cells ranged from 14,000, with 60 per cent. poly, to 40,000 and 80 per cent. poly.

In the case of Ber. K., fifteen months old, ill three weeks, there were 20,000 white cells, with 52 per cent. poly (recovery). Case of Beckie G., two years, 28,000 white cells; poly, 92 per cent. (recovery). Max B., ten months old, ill two weeks, had a count of white cells of 40,000, with 62 per cent. poly. In his case there was a general erysipelas, with meningeal involvement, and the spinal fluid contained streptococci. The case terminated fatally.

The diagnosis of effusion having been made, *exploratory puncture* is indicated to establish the nature of the fluid. A negative puncture is not conclusive; the pus may be thick or the needle be too small, or it may have penetrated some of the large fibrin masses so commonly disclosed at the time of operation.

Decision as to the nature of the turbid fluid, whether pus or not, is difficult at times. Many of the cases are on the border line between the purulent and serofibrinous types.

Furthermore, the tendency of pus to sediment in the chest must be remembered. Not infrequently a specimen from the upper layers may be turbid, while pus is found lower down.

In encysted cases, or when the signs are atypical, radioscopy is of material service.

Treatment.—The medical treatment varies with the individual case. The indications must be met as they arise. As breathing is more or less impeded by the effusion, particular attention ought to be paid to the gastrointestinal tract. Tympanites in particular must be prevented by a judicious diet, colonic flushings with a low pressure or the insertion of a catheter into the rectum at regular intervals. To quote from a previous paper, read before the Academy of Medicine, May 19, 1887, I would say no reliance can be placed upon measures intended to produce absorption of the purulent products. Our therapeutic resources enable us to combat special symptoms and improve the general condition with the aid of proper food and stimulants of various kinds. Good hygienic surroundings are essential. During the active inflammatory stage, symptomatic treatment is indicated. Caffein, strychn., am. carb., liq. am. anisat., etc., are of value.

Border-line cases, in which the effusion is turbid and slightly purulent, and cases of serofibrinous effusions, are benefited by medical measures; pus cases are distinctively surgical. Exceptionally, aspirations, perhaps repeated, may result in a cure.

Aspiration, as a tentative measure, has its indication, and is a valuable aid in guiding cases over danger points when the amount of fluid is large, the general condition bad or the constitutional symptoms severe.

In perhaps 1 in 10 cases admitted to our hospital service aspiration of from 4 to 6 ounces is indicated because of severe dyspnea, cyanosis or rapidly developing cardiac weakness, with or without pulmonary edema or excessive amount of fluid with great displacement of the heart. The danger is greater when the left side is involved.

Thoracentesis is a temporary expedient; more radical measures are subsequently required.

From the surgical standpoint, empyema may be regarded as an abscess, with partly rigid and partly flaccid walls. Thorough drainage having been secured, (a) the cure is accomplished by the falling in of the chest walls; (b) resumption of the proper posi-

tion of the organs or structures displaced by the fluid, and (c) expansion of the compressed lung. The last factor is of the utmost importance; unless the lung is in a condition to expand, cure will not result until the empyemic cavity is obliterated by extensive resection of ribs and the thoracic pleura.

As to the time of operation—in the absence of sepsis, diarrhea or other unfavorable symptoms—I am in accord with the view of those authorities who prefer to delay radical operation until the acute inflammatory process has subsided and the attending complications are under control. To add a traumatic insult at the height of an acute infection invites additional dangers and may tend to lessen the patients' chances.

In a few patients, in whom the condition was so desperate at the time of admission and who would not have withstood the shock of an operation of any gravity, puncture with trocar and cannula and drainage with rubber catheter of small caliber was employed for a few days until more radical means could be resorted to. Primary rib resections were made in 8 cases, 4 in the series of 1908 and 4 in 1909.

With the above-mentioned exceptions, the rest of the cases were operated upon by simple incision and drainage; a double drain, with strips of balsam of Peru gauze on either side, was inserted into the pleural cavity and the usual dressings applied. The dressings were changed whenever pus appeared through the compound pad.

As the greater number of our cases were associated with pneumonia, the temperature after operation would continue until the pulmonary condition improved. Otitic complications not infrequently gave rise to more or less irregular fever. Pyocyanus infection occurred now and then as a secondary process, and would give rise to an irregular type of fever persisting for ten days to two weeks. In from six weeks to two months the greater part of the cavity would be obliterated and a sinus only remain. The latter would generally close within a few weeks or month. In 10 cases secondary rib resections were required. At the operation, bony bridges were usually found, similar to the photographs on page 192. Cure readily followed.

Anesthesia was rarely employed. In simple incision, with drainage, it is not necessary; in the rib resections, particularly secondary resections, anesthol was the anesthetic of choice.

ELSBERG'S POSITION.

For years our cases have been operated upon lying flat on the abdomen, the incision made one or two interspaces below the angle of the scapula, simply because the position was more convenient, and as anesthesia was but rarely employed, the little patients could be restrained better.

The healthy side is not affected in any way or manner, and breathing is not further embarrassed. Cyanosis or other threatening symptoms frequently arise when the unaffected lung is compromised in its movements.

"The experiments of Elsberg demonstrate that the position has manifest advantages. It is a very simple method of safeguarding our patients a little more in intrathoracic operations" (*Journal Experimental Medicine*, 1909, Vol. XI., No. 3).

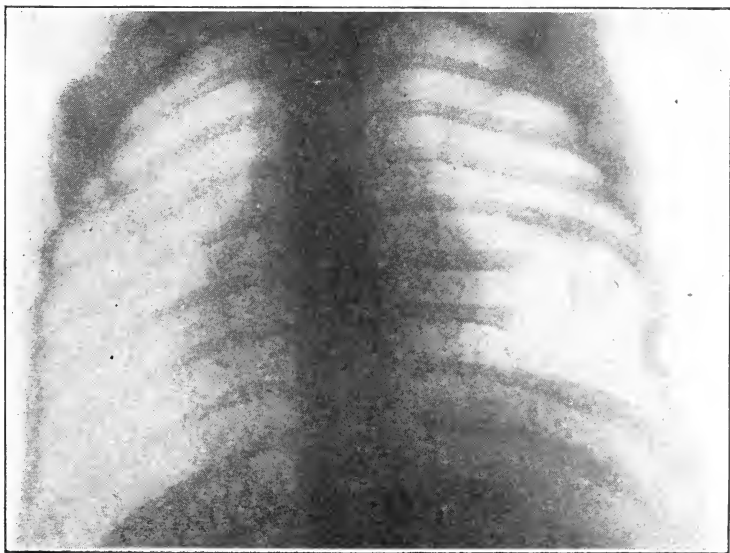
With the patient flat on the stomach, the head can be turned to one side or supported beyond the end of the operating-table and the anesthesia given without trouble.

The plan suggested by J. B. Murphy, of Chicago (formalin-glycerin injections), has been employed on several occasions. The solution used is a 2 per cent. solution of formalin in glycerin, made at least twenty-four hours before using, in order to insure complete solution of the formalin. After aspirating the greater portion of the pus or fluid, inject 20 to 200 c.c. of the solution, and repeat it every third day until the fluid aspirated loses its purulent character. The quantity injected may be doubled at each injection, until 400 c.c. is reached, and the interval may be lengthened.

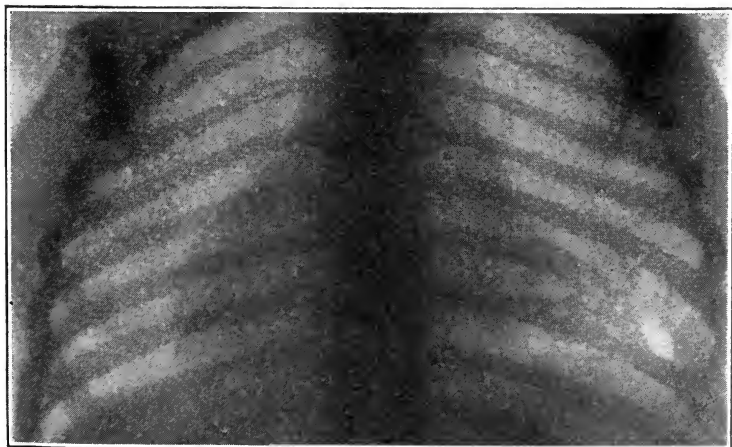
The results have not been satisfactory thus far. It is possible that we may not be familiar with the technique.

About three-quarters of our cases are pneumococci infections, the pus containing large flakes and masses of fibrin. It is consequently difficult to draw off a great deal of fluid, for the fibrin is apt to clog the needle or cannula. When, under these circumstances, the solution is injected, it may possibly be too dilute to accomplish the desired effect. The fluid withdrawn at the subsequent tapplings was found to be decidedly less purulent, due not so much to a change in the character of the inflammatory process, but rather to a deposition of pus cells. The fibrin masses also would become more brittle and tend to disintegrate. In a few cases there would be a good deal of leakage into the tissues of the thoracic walls, giving rise to a burning pain and decided

tumefaction. The former would disappear in a few hours, the swelling persisting for days; when such tissues were incised, they would cut like brawn, bleeding but little. On two occasions there was a steady flow from the puncture, necessitating immediate incision and drainage.

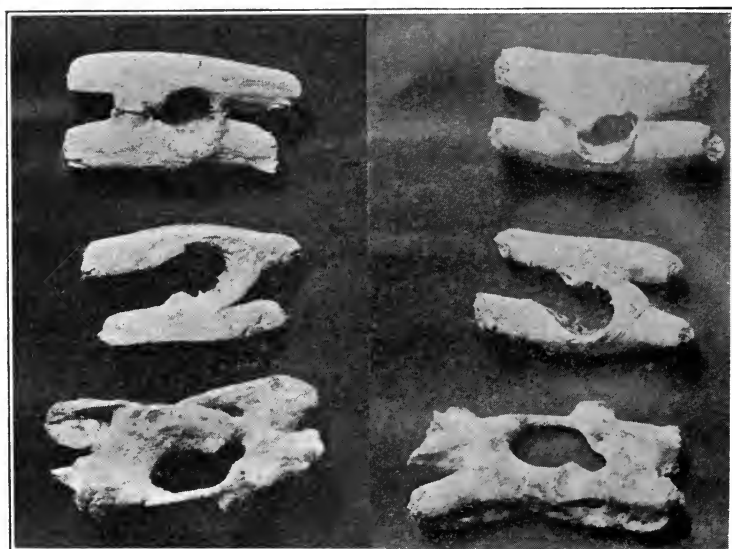


X-ray photo of Abie W., taken by Dr. I. S. Hirsch, June 16, 1909, a secondary rib resection having been performed June 7, 1909. (Specimen Fig. 3.)



X-ray photo of Abie W., taken by Dr. I. S. Hirsch, April 12, 1910, showing restoration of bone, the last operation having been performed June 7, 1909.

A persisting sinus may be due to a variety of causes; these will vary with the individual case. Imperfect expansion of the lung, due to poor muscular development, an excess of granulation tissue in the deeper portions of the wound, necrotic bone or the existence of bony bridges (as shown in photo), preventing a falling in of the ribs, are some of the factors leading to the production of a sinus in cases of simple incision with drainage. Thickening of the pleura, interfering with pulmonary expansion, is a frequent



ANTERIOR VIEW.

POSTERIOR SURFACE.

Resected ribs, showing bony bridges and new bone formation. (Reduced one-half. Photos by Dr. I. S. Hirsch.)

FIG. I. (Upper Specimen)—Charley R., five years of age. Thoracotomy, April 20, 1908. Resection, September 8, 1908.

FIG. II. (Middle Specimen)—Becky J., fifteen months old. Thoracotomy, October 12, 1908. Rib resection, January 3, 1909.

FIG. III. (Lower Specimen, New bone formation)—Abie W., four years old. Thoracotomy, August 31, 1907. Resection, November 12, 1907. Secondary resection, June 7, 1909.

cause in chronic cases. Following resection of one or more ribs, necrotic pieces of bone, granulations in the wound and a thickened pleura may be the cause of a sinus not healing. Excessive probing and too long retention of the drain must be avoided.

After operations, patients are allowed out of bed as soon as the condition will permit, in order to improve their general health and muscular tone. Nasal obstruction is relieved by removal of

adenoids and tonsils, to secure better and deeper breathing. Massage of the chest and proper exercise, to favor expansion of the lung, is advised. The children are encouraged to blow soap-bubbles, or force colored fluids from one bottle to another, as advocated by Dr. W. B. James.

Beck's method of treating the sinus was disappointing to our experience, though the technique advised was carried out in a number of appropriate cases. Apparent cures were followed out by renewed suppuration, with discharge of pus and bismuth vaseline.

Examinations of many of our patients, months and years after recovery, show that, aside from the scar and new bone formation, there are few or no evidences of untoward sequelæ in cases operated upon early, that is, within a few months from the beginning of the illness. Pulmonary expansion was good, breathing and voice unchanged, no retraction or deformity of the chest noticed. X-ray studies of some of the children, by Dr. I. S. Hirsh, confirm the above statements. In chronic cases, with thickened pleura and interstitial changes in the lung, there may be only partial re-expansion with considerable thoracic deformity. West reports 2 cases of serofibrinous pleurisy, in which the lung was capable of expansion after eighteen months. (*Lancet*, March 25, 1905.)

MAGNESIUM SALTS IN TETANY.—C. Canestro (*Policlinico*, 1910, Vol. XVII., 3). In dealing with the subject of tetany due to loss of parathyroids, the author quotes the observation of Meltzer that salts of magnesium quiet the nervous mechanisms that control the vital functions. He has injected carefully sterilized 7.3 per cent. solutions of magnesium sulphate and chlorid into dogs in which he had previously performed parathyroidectomy. With the animal convulsed, and showing quickened cardiac and respiratory action, there has always ensued a rapid amelioration of these symptoms for a time varying from five to twelve days, even in cases where death has subsequently supervened. The author believes that the method may be useful where time is required to tide over serious symptoms of tetany until hyperplasia of persistent or accessory parathyroid has occurred, or till parathyroid grafts have been made. The dose used for dogs was 0.5 gram per kilogram of animal body weight.—*Prescriber*.

A CASE OF MEDIASTINAL CYST PRODUCING COMPRESSION OF THE TRACHEA, ENDING FATALLY IN AN INFANT OF NINE MONTHS.*

BY A. D. BLACKADER, M.D.,

Professor of Diseases of Children, McGill University,

AND

DAVID J. EVANS, M.D.,

Lecturer on Obstetrics, McGill University.

The following case, which presented symptoms closely resembling those reputed to arise from compression of the trachea by the thymus gland, is sufficiently interesting to warrant our placing the details of it before this Society. For the privilege of seeing it and for the history of the case Dr. Blackader was indebted to Dr. David J. Evans, of Montreal, the physician in charge.

P. S., male, was born July 28, 1909, after a rapid and comparatively easy labor. The child was nursed by its mother until he was over six months of age, when weaning took place. At this time its weight and general condition were excellent and no difficulty either with respiration or deglutition was noticeable. When seven months old the infant contracted German measles, of which there were several cases in the household. During the attack no special symptoms were noted, but after it passed off bronchitis, with frequent loose movements from the bowels, set in, and brought on a noticeable interference with general nutrition. While this condition persisted, the temperature was only slightly elevated, but at times the respirations were of such a peculiar, croupy type that Dr. Birkett, a laryngologist, was asked to examine the infant. He reported that he could see no condition about the larynx to account for the noisy respiration.

While the bronchitis persisted, the child was confined absolutely to two rooms in the house, in both of which care was taken to maintain an even temperature and good, effectual ventilation. A few weeks later indications of rachitis developed, with sweating of the head and tenderness and slight enlargement of the costochondral articulations.

Toward the end of March the child improved again, took nourishment freely and gained in weight. Throughout all this period the breathing, as a rule, was quiet and natural; but occasionally, without apparent cause, sudden dyspneic attacks oc-

* Read at the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May 3-5, 1910.

curred, and were associated with moist râles at the base of both lungs.

On the first of April the child became suddenly worse; the mother said it had caught a fresh cold, which she attributed to having taken greater liberty in moving it from room to room in the house. The breathing now became labored and difficult; respirations rose in frequency to between 40 and 50 per minute, and expiratory stridor was distinctly evident. A physical examination showed a hyperresonant condition over the whole chest; but air seemed to enter the air spaces freely. No enlargement of the heart was apparent. At the upper part of the chest anteriorly there was an area of definite dullness, extending both right and left of the sternum and downward to the middle of the second costal cartilage. There was no pyrexia. The child took its nourishment fairly well, and at times played with its toys.

During the next two days it remained in about the same condition, though sleep was frequently disturbed by attacks of coughing and of dyspnea. On the evening of the third Dr. Evans regarded the condition as distinctly improved. Early on the following morning, however, the dyspneic attacks became more severe and the respirations increased to between 60 and 70 per minute.

During these dyspneic attacks the infant had an appearance as if struggling for air. There was a slight bluish tinge about mouth and nose, but no evidence of cyanosis in the fingers or toes. Each attack lasted a few minutes, and ended by the child expelling a quantity of flatus. After this it gradually returned to a quieter condition, looking pale and exhausted, while the head was bedewed with moisture.

In the afternoon, the attacks came on with increasing frequency and lasted four or five minutes at a time. In the intervals the child remained in a somewhat torpid condition and refused to swallow anything, struggling violently if any fluid was put in his mouth.

At nine o'clock that evening the infant was seen by Dr. Bell, Dr. Birkett and Dr. Blackader. A physical examination revealed an area of definite dullness extending 3 cm. to the right and 2 cm. to the left of the median line, and downward 5 cm. from the episternal notch. During expiration the edge of a firm body was quite palpable directly above the left sternoclavicular joint. This was supposed to be an enlarged thymus gland producing pressure on

the trachea, and the question of operation was discussed with Dr. Bell, the surgeon. The condition of the child, however, was deemed to be so grave as not to warrant any operative procedure.

During the night the attacks of dyspnea became still more

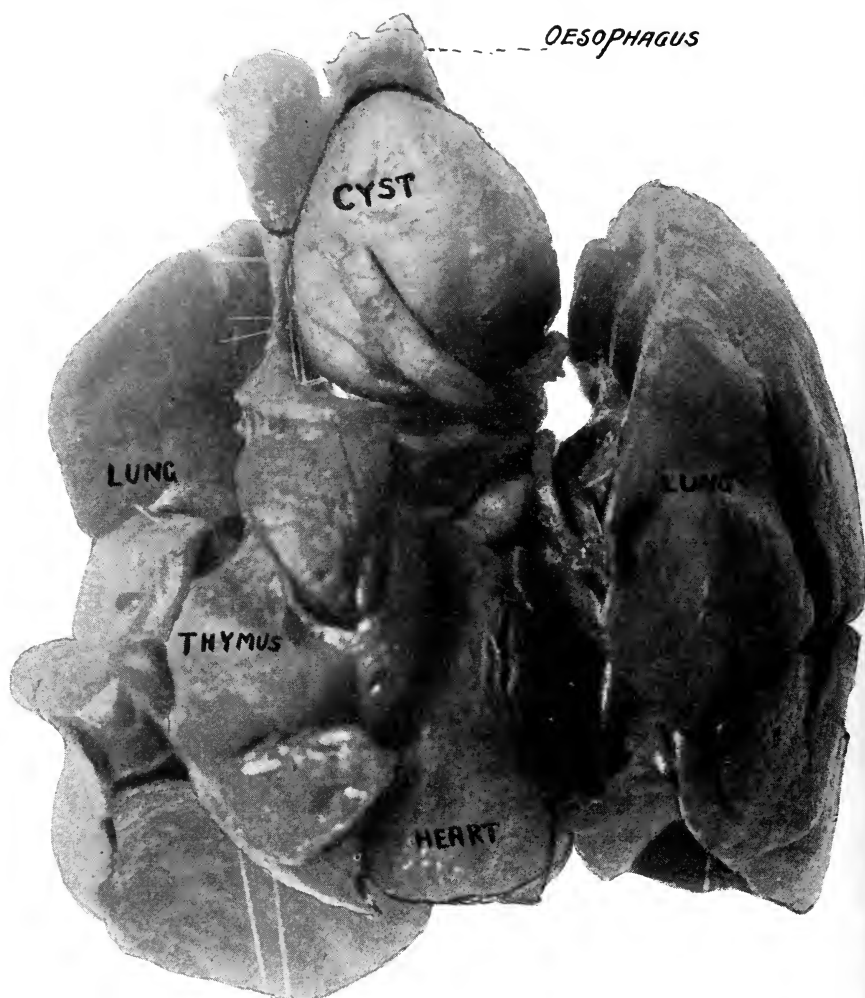


FIG. 1.—Front view. Specimen was mounted on a glass frame in its exact anatomical position, so that the photographic view is same as looking into the opened chest.

frequent. A small dose of morphia given hypodermically appeared to give relief, and the child fell asleep for two hours. At four o'clock, during a more than usually severe attack, the respiration ceased entirely, but, under stimulation, again started.

Cardiac stimulants were now administered, but death took place three hours later.

Permission was obtained from the parents for a limited autopsy. This was performed by Dr. John McCrea, of the Royal

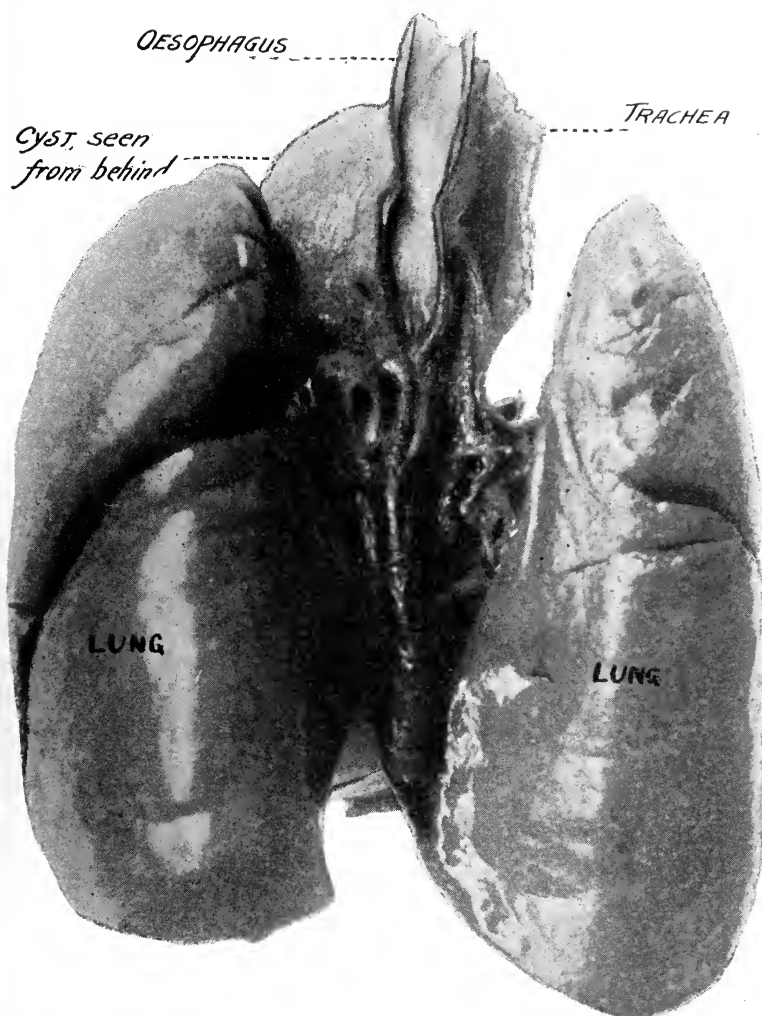


FIG. 2.—Back view, showing the relation of the esophagus and trachea to the posterior aspect of the cyst.

Victoria Hospital, the same evening. The following is his report:

"On opening the thorax numerous adhesions were noted between the top of the sternum and the thymus gland. The thymus gland itself was very prominent; it measured 5 cm. long by 3 cm. wide, and was bifurcated below. It reached as low as the fourth

interspace, namely, half way down the front of the right ventricle. On lifting it up a rounded, yellowish cyst was seen to lie behind it. The cyst measured 4.75 cm. x 4.5 cm. x 3.5 cm.; was roughly globular in shape and in places a little bossed, as if multilocular. Its upper edge reached about 1 cm. above the sternal notch, or slightly higher, scarcely reaching the lower edge of the thyroid gland. It lay partly behind, but mostly to the left, of the trachea, and partly in front, but mostly to the left, of the esophagus, so that its right side projected between these two, pushing one forward and the other back. Looked at from the front it reached $1\frac{1}{2}$ cm. to the right of the trachea and 3 cm. to the left. It lay behind the thymus and appeared to project downward against the left auricle. Coursing over the front of the cyst were the innominate and the carotid arteries, and the left pneumogastric nerve. These were all held loosely by connective tissue lying on the sac wall.

"No pedicle could be found, nor could any connection be seen that was not superficial to the surrounding organs. Both the trachea and the esophagus were normal on opening. The lungs were bulky and emphysematous. Both pleuræ and pericardium were normal.

"On opening the cyst it was found to contain about one ounce of clear, viscid mucus-like fluid, of the consistence of the white of egg. It was unilocular, with imperfect subdividing walls inside. On section, the wall was found to be muscular and fibrous; the muscles lay in two layers, at right angles to each other; the inner was circular and the outer was longitudinal. Inside of this was connective tissue, while the inner surface was lined by well-defined columnar ciliated epithelium."

After a careful research throughout all the available literature at our command, we can find no report of any case quite similar to this. At first it was deemed to be a branchial cyst. Branchial cysts, however, are situated, as a rule, laterally in the neck, 2 to 3 cm. above the level of the clavicle, and near the inner border of the sternomastoid muscle. Kaufmann states, however, that a cyst representing the fifth branchial cleft may have a position in the median line low down, just above the sternal notch; nevertheless, its connections would point upward toward the root of the tongue. Such a cyst would be lined with mucosa covered with ciliated epithelium.

Ziegler, in his text-book of special pathology, states that cysts

may arise as a consequence of an imperfect closure during fetal life of the communication between the respiratory passages and

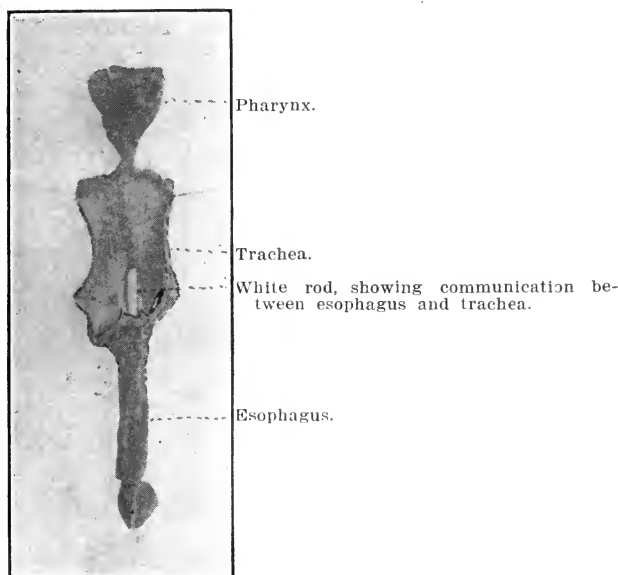


FIG. 3.—Congenital absence of esophagus in upper half. Pharynx above ends in a blind pouch. Lower half of esophagus communicates with trachea at bifurcation. (From a specimen in the Pathological Museum of McGill University.)

the esophagus. Such communication usually has its site above the bifurcation of the trachea, and may occur when the two ends of this communication close and the passage itself remains as a cyst.

Two other methods of origin have been described: One in which rests are pinched off from the trachea or from one of the bronchi; possibly in some cases representing a portion of an accessory or rudimentary bronchus. In other cases they appear to arise from dilatations of mucous glands in the wall of the trachea. Such are said generally to occur on the posterior wall of the trachea, and may be as large as a walnut and protrude into the space between the trachea and esophagus.

The relation our cyst bore to the surrounding tissues, together with the absence of cartilage, and the character of its walls with two distinct layers of muscular tissue, all point to the probability of its origin in a partial persistence of the original fistulous communication between the trachea and esophagus; its character

also differentiates it from any dilatation of a mucous gland, or rest pinched off from the trachea or bronchus. Although both Kaufmann and Ziegler refer to the occurrence of mediastinal cysts of the origin described, we are unable to find any similar case to our own reported.

Cysts of the mediastinum are reported by several writers, but have little resemblance in their details to this one.

Stilling reports a cystic tumor in the upper part of the anterior mediastinum in a man of forty-five years, who died of cerebral hemorrhage. The cyst was the size of a hen's egg, and lay under the arch of the aorta, only lightly bound down. In its walls were mucous glands, cartilage and basal membrane resembling that of trachea, and it was lined with ciliated epithelium. It thus appears to have arisen from a pinched off rest from trachea or bronchus.

Virchow relates the case of a mediastinal cystic tumor in a man of twenty-two years, which produced no cough, dyspnea or pain. It was in part sarcomatous and in part cystic. In the walls of the cyst were muscle bands, mucous glands and plates of cartilage lined with ciliated epithelium. He regarded it as a teratoma myomatodes.

C. Henning gives the details of a cystic growth found in a stillborn babe. The cyst was of the size of a plum, near the esophagus, extending between the level of third and fifth cervical vertebrae. Its origin is not discussed.

Kurz reports a case of diverticulum of the esophagus, which, when full of food, compressed the esophagus and rendered swallowing difficult. Washing out this diverticulum at once gave relief and the child improved.

Riegel states that in the 42 mediastinal tumors spoken of in literature, 5 were so-called "dermoids"; but all his cases were of adult age.

The literature of mediastinal cysts, however, is extremely scanty, and we have found none in the literature at our disposal which bears any close resemblance to the one we have described.

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A COLLECTED STUDY OF 60 CASES OF MENINGITIS AND CONDITIONS SIMULATING MENINGITIS WITH SPECIAL REFERENCE TO DIAGNOSIS.*

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During the past six months, since the Research Laboratory of the Health Department, under the direction of Dr. Park, began to undertake the treatment and study of meningitis cases in the city, including the preparation and distribution of the meningitis serum, I have studied clinically and bacteriologically 60 cases of meningitis and conditions simulating meningitis.

This investigation has already yielded much interesting information as to the etiology of the cases classified simply as meningitis. The clinical diagnosis of the bacterial cause of the various forms of meningitis has often differed from that established by the laboratory findings. The difficulty and resulting errors in private practice in establishing a true etiological diagnosis as to the type of meningitis and in differentiating between meningitis and meningism has been forcibly impressed upon me.

TABLE I.

True or Probable Diagnosis	Reported Clinical Diagnosis by Attending Physicians
16 Cases Tuberculous Meningitis	{ 4 Meningitis (unclassified) 5 Cerebrospinal Meningitis 6 Tuberculous Meningitis
10 Cases Cerebrospinal Meningitis	{ 5 Meningitis (unclassified) 1 Tuberculous Meningitis 1 Myelitis 3 Cerebrospinal Meningitis
4 Cases Acute Suppurative Meningitis due to { Pneumococcus..... { Streptococcus Pyogenes..... { Unidentified Gram positive coccus (no growth)..... { Influenza	{ Tuberculous Meningitis Cerebrospinal Meningitis
18 Cases { 3 Poliomyelitis	{ Meningitis (unclassified)
{ 2 Intestinal Intoxication.....	
{ 1 Cerebrospinal Lues.....	
{ 8 Bronchopneumonia.....	
{ 2 Enteritis.....	
{ 1 Fractured Skull (?).....	
{ 1 Spastic Paraplegia.....	
12 Cases { Undetermined.....	{ Meningitis
{ Diagnosis, but no menngitis found, bacteriologically.....	

* Read before the New York Academy of Medicine, Section on Pediatrics, February 9, 1911.

In this paper I shall give a table showing comparative clinical diagnoses and true bacteriologic diagnoses, and shall indicate a number of the more important clinical data, which in my study of the cases I have found of considerable value in establishing a clinical diagnosis before lumbar puncture is done.

From the study of the table it is evident that of the true inflammations of the meninges, tuberculous meningitis is the form most frequently met with and most often confused with the other forms, especially with epidemic cerebrospinal meningitis. Of the conditions simulating meningitis, I found bronchopneumonia in children, especially those forms with apical lesions, most often mistaken for meningitis. Other conditions were gastroenteritis, other acute infections such as typhoid, and other conditions of the central nervous system as cerebrospinal lues, and anterior poliomyelitis.

Tuberculous meningitis, can, I believe, in the majority of cases, be diagnosed clinically; the clinical picture is as a rule very definite and distinct. The patients are quite often very well nourished and are usually under two years of age, but the disease occurs not infrequently in later life. Quite often a family history of tuberculosis can be obtained. The onset is an insidious one of two weeks or longer, of apathy, crying restlessness, occasional vomiting, fever; in younger children convulsions are quite frequent, in older children severe headache is complained of. The mother will often call attention to the symptoms which are most important for establishing a differential diagnosis. She will complain that the child does not seem to recognize her, is stuporous and sleeps most of the time. This condition of apathy, stupor, and impaired mentality is very striking in all cases during the greater part of the illness; the children lie stupid, expressionless, do not notice their surroundings, and respond very slowly and indifferently to external stimulation. In adults, almost the same condition exists. I recall one patient, a man of twenty-two, who was brought in to me in the very early stages complaining only of severe hiccough. The symptom, however, that impressed me during my examination was the marked stupidity, listlessness, indifference of the patient. On further and closer examination, finding a few evidences of cranial nerve involvement, slight facial paralysis, slight pupillary irregularity, temperature 100°F., and a few signs of probably old healed lesions at one apex, I made a

tentative diagnosis of tuberculous meningitis; two days later he developed rigidity of the neck, stupor increasing to coma, convulsions; cerebrospinal fluid showed tubercle bacilli. Other signs of importance are evidence of marked internal hydrocephalus, with the resulting Macewen in older children, or marked fontanel bulging in younger children. Convulsions and local palsies, principally facial paralysis, paralysis of the eye muscles or paralysis of one arm and leg are more common in tuberculous than in other forms of meningitis; the transitory nature of these palsies is especially striking; a palsy one day will be gone the next—and reappear as suddenly. Likewise vasomotor change, indicated by frequent marked flushing of the face or body, and marked tache are common; considerable irregularity of the pulse, and slow, deep, sighing irregular respiration is often seen. Rigidity of the neck and Kernig are only moderate as a rule. The reflexes are irregular; at the onset of the disease, usually exaggerated; later in the disease, diminished or absent. Pupils are often irregular, and respond very sluggishly or not at all to light. The temperature in the early part of the disease is only moderate, up to 101° F. or 102° F., highest in the evening. As the disease progresses the temperature ranges high, up to 104° F. or 105° F., and may show the marked intermittency of the cerebrospinal forms. Demonstration of tubercles in the choroid of course is conclusive. Tuberculous meningitis runs a very acute course, death usually occurring from two to four weeks after definite symptoms occur.

Epidemic cerebrospinal meningitis has also as a rule a definite and distinct symptom-complex. The children average older; the onset is more acute, with rigors, high temperature, prostration, and severe projectile vomiting. The cerebral condition is often directly the opposite of tuberculous meningitis. As against the striking apathy, indifference, impaired mentality, we see very hypersensitive, irritable, constantly crying, complaining patients, objecting to any disturbance. Mentality while usually flighty, and disturbed by periods of delirium, is often, except in the last stage of disease, entirely unimpaired for hours. Retraction of head, tenderness in back of the neck and Kernig are marked. Reflexes are irregular; most often diminished or absent, sometimes during the early period of the disease increased. Palsies are often entirely absent. Pupils respond only sluggishly or not at all to light. Bulging fontanel or Macewen is usually marked, but often to a

lesser degree than in the tuberculous form. The pulse and respiration changes are not as marked, except in cases with marked hydrocephalus, usually in advanced stages of the disease. Petechiæ and herpes are frequently seen. Temperature is usually high; while continuous high temperature occurs, the usual picture is that of a very high intermitting curve; the cerebral temperatures up to 106° F., or over, are not frequently seen in this form of meningitis.

From the above description, it is apparent that the two conditions of cerebrospinal and tuberculous meningitis, while frequently easily differentiated, may sometimes so closely resemble each other clinically, especially in the late stages of cerebrospinal meningitis or the early stages of tuberculous meningitis, that it may be impossible to make a clinical differential diagnosis. A case I saw recently illustrates this point. A boy, Italian, six years old, had an acute onset with high temperature, rigors, vomiting, delirium, apathy, stupor, stiffness of the neck. On the twelfth day, when I saw the patient, he was extremely apathetic, stuporous, almost comatose; however, on being disturbed he was irritable and resistant. Orientation was much impaired, but he did respond occasionally. Neck markedly rigid, Kernig marked. Tache marked, frequent flushing of the face, pupils irregular, fixed; left facial palsy. Macewen marked. Pulse rapid, irregular, respirations deep, sighing, slow, irregular. Temperature 105° F. Here the history pointed to a cerebrospinal meningitis, but the marked stupor and apathy, with evidence of extreme internal hydrocephalus, local palsy, and vasomotor disturbances, made me very suspicious of tuberculous meningitis; however, the irritability and restlessness, slight response to questions even at the late advanced stage of the disease, the marked rigidity of neck and Kernig, made me lean more to the cerebrospinal diagnosis. Lumbar puncture demonstrated a very severe form of epidemic cerebrospinal meningitis.

The other acute forms of meningitis, as streptococcus pyogenes, streptococcus mucosus capsulatus, pneumococcus, influenza, present almost the same symptom-complex as epidemic meningitis. The history of previous disease, such as otitis media, may be of some help, but the diagnosis can only be definitely established by lumbar puncture and examination of the cerebrospinal fluid. It is important to note here that in pneumococcus meningitis, as

was well illustrated by Holt¹ in 2 of his cases, the cerebrospinal fluid may be sterile, due to a localized cortical meningitis.

Meningism complicating other acute infections, while sometimes difficult to differentiate from epidemic meningitis, can as a rule be diagnosed. First one must establish the presence of the primary infection, very often bronchopneumonia or one of the other conditions mentioned in Table I. The mental symptoms of restlessness and irritability are not accompanied by the anxiety, constant crying and complaining of the usual epidemic meningitis; unless delirium is present, the patient is usually bright and intelligent, and responds readily to questions. Rigidity of neck is only moderate, can often be relaxed, and one will often notice that while opisthotonos is present the patient will still be able to turn his head with ease from side to side. Kernig is also only moderate or absent and the Macewen sign, or fontanel bulging, may be present to a lesser degree. With the subsidence in temperature and the improvement in the original infection, the meningeal symptoms disappear.

Poliomyelitis, not infrequently for several days before palsies appear, may present meningeal symptoms, as headache, some rigidity of the neck, some Kernig. The patient usually, however, does not present any of the other cerebral symptoms mentioned. He looks bright and comfortable, and does not impress one as suffering from cerebral disease.

Polioencephalitis often resembles tuberculous meningitis clinically; however, here the local palsies, such as hemiplegia, are extensive and permanent. Other times the clinical signs of an acute active meningitis will be present; but here also the palsies are striking. Convulsions are frequent. Diagnoses may be suspected during the acute stage, but can only be absolutely established by lumbar puncture.

Blood count is of aid in diagnosis. The principal features are, in the cerebrospinal form, the high leukocytoses of 20,000 or more, with the high relative polynucleosis up to 99 per cent. In the tuberculous meningitis is seen a moderate leukocytosis, up to 18,000 or occasionally more, with a moderate relative polynucleosis up to 80 per cent. or more. Poliomyelitis and polioencephalitis in the febrile stage show a slight leukocytosis; meningism secondary to another disease of course gives a blood count depending on the disease causing it.

Von Pirquet was not done in this series, but, judging from Holt's cases, it would seem to be of value in diagnosis in young infants, and in older children, at least in the negative result.

Once a clinical diagnosis of meningitis is made, whatever the form, a lumbar puncture should always be performed. A clinical diagnosis is never certain and even with a complete picture of a type of meningitis errors may be made.

The following is a table showing the character of cerebrospinal fluid in the different types of the infection.

TABLE II.
CEREBROSPINAL FLUIDS.

	Normal	Meningism	Polyomyelitis Polioencephalit	Cerebrospinal Meningitis	Streptococcus, Pneumococcus, Influenza, etc., Meningitis	Tuberculous Meningitis
Color	Clear	Clear	Clear	Cloudy—pus sediment	Cloudy—pus sediment	Clear—white flakes—fibrin- network
Pressure	Low—escapes slowly drop by drop	—	+	++	++	+++
Quantity	Little - few c.c.	+ (up to 50 c.c. or more)	+ (up to 50 c.c. or more)	++ (up to 100 c.c. or more)	++ (up to 100 c.c. or more)	+++ (up to 100 c.c. or more)
Cytology	Few cells, leu- kocytes and endothelial	Few cellular elements	Cells increased (+) in number Lymphocytes 90% or more	Cells numerous +++ (Poly- nuclear up to 100%)	Cells numerous +++ (Poly- nuclear up to 100%)	Cells numerous +++ (Lymph- ocytes up to 90%)
Bacteriology	Sterile	Sterile	Sterile	Meningococcus	Infecting or- ganism	Tubercle bacil- lus
Albumin (nitric acid test)	Faint trace	Trace	Trace	+++	+++	+
Fehling's Solution	Reduces	Reduces	Reduces	Unreliable	Unreliable	Unreliable
Globulin Test	Negative	Negative	Positive in early stages	+++	+++	++

* NOTE.—Where tubercle bacilli are not found in spread from the sediment, animal inoculation, if case is tuberculous, will produce tuberculosis within six weeks.

A study of the cerebrospinal fluid, therefore, as the above table shows, will, in the case of acute suppurative meningitis, enable one at the first examination, as a rule, to find the infecting organism. The very unusual exceptions are very rarely in the very onset of epidemic cerebrospinal meningitis, before the organism is free in the cerebrospinal fluid, or, as already mentioned, a localized meningitis, as the localized pneumococcus meningitis mentioned in

Holt's cases. It is important, especially in meningococcus infection, where a positive culture is desired, to subinoculate the sediment on suitable culture media as soon as possible after withdrawal from the canal. Where we have been unable to obtain the fluid for inoculation within a few hours after withdrawal, we have been able to demonstrate the organism in smears, but sometimes no growth has been obtained. The delicate nature of the organism when first obtained, its tendency to rapid autolysis, explains the reason for this precaution. The usual media used by us for routine subinoculation of sediment has been 2 per cent. glucose serum agar, blood agar, and 2 per cent. glucose serum bouillon.

In tuberculous meningitis the bacilli can, in a very large percentage of cases, be found in the cerebrospinal fluid at some time during the course of the disease, usually the first examination being sufficient to demonstrate the organisms. Bernstein,² in a series of 102 cases, found the bacilli in 98 per cent. Hemenway,³ in a recent publication, reports that the bacilli were found in 135 out of 137 cases studied. Where one can put the cerebrospinal fluid aside immediately to obtain the unbroken fibrin network, as was done in Hemenway's cases, the chances for finding the bacilli are very much larger. Most of the fluids sent to us for examination are considerably shaken up; centrifuging of the fluid for an hour or longer, collecting the sediment on a coverslip and staining for tubercle bacilli has enabled us to find the bacilli in most of the cases. Long and patient search is necessary; the bacilli are usually very few and scattered, and sometimes a few hours may be spent in search before they are found. An important point to remember is that where the organism is not found during life, an examination of the cerebrospinal fluid obtained postmortem will often demonstrate the bacilli in clumps in large numbers. Animal inoculation in positive cases, where bacilli have not been found, produces tuberculosis in four to six weeks. In the combined tabulation by Park and Krumweide⁴ of their own cases, numbering 36, and 47 cases reported by others, totalling 83, the human type of bacillus was found in 86 per cent. Of their own cases, the majority were bottle-fed children; of two breast-fed children, one was due to the bovine bacillus, the other, human.

Cytological examination is extremely important. The increase in the number of cells in inflammatory meningitis is constant; in the suppurative forms of meningitis the preponderance of poly-

nuclear leukocytes is striking; in the late stages of cerebrospinal meningitis, however, as in chronic basic meningitis, a relative lymphocytosis is present; in tuberculous meningitis the excess of lymphocytes up to 100 per cent. is marked; occasionally, however, one will see a tuberculous fluid, in which bacilli have been found, which is cloudy and shows an excess of polynuclear leukocytes, up to 90 per cent.

An attempt to classify any particular type of meningitis merely on the number of cells without the demonstration of the infecting organism, as was recommended by Dunn⁵ in the case of tuberculous meningitis, would apparently be an uncertain thing to do, especially in view of the very large percentage of cases of meningitis where the infecting organism may be found.

The gross fibrin contents of the fluid after standing is a fairly constant guide, there being an increase in meningitis, and very little fibrin in normal fluid. The reduction test of Fehling's solution has been found of no value by us.

Noguchi's⁶ globulin test, in a small number of fluids we examined, was substantiated; in inflammatory condition, a positive reaction being present, indicating an increase of the globulin content in the cerebrospinal fluid.

Other gross methods, depending on the estimation of the protein content in the cerebrospinal fluid, have been recommended for differential diagnosis between the inflammatory fluids occurring in meningitis, and the normal fluid, fluids in cases of meningism, or in cerebral conditions, as brain tumor. The acetic acid test, described by Mortiz,⁷ consists in the appearance of a white cloud or a precipitate on the addition of a few drops of 5 per cent. acetic acid to 2 c.c. of the inflammatory fluid. The nitric acid test described by Runeberg,⁸ is the addition of a few drops of nitric acid to the cerebrospinal fluid; meningitis fluid giving a white precipitate. The nitric acid ring test is a very convenient way of applying this test; most albumin occurring in acute suppurative conditions, less in tuberculous meningitis, and only a trace in normal fluids, and fluid in meningism.

A gross method has recently been very carefully described by Mayerhofer⁹—the quantitative reduction of permanganate, in an acid solution on boiling. His conclusions are, that in normal fluid the reduction index is low; in meningitis the index is high, from 2 to 8; that after the injection of meningitis serum with favorable reaction, the index drops, therefore, the test might so be used

as an index to prognosis. He thinks that the test can be used to differentiate exudate and transudate.

In this paper, I shall only briefly mention treatment; to say that, in the main, the treatment of epidemic meningitis by us has been carried out along the lines laid out by Flexner; consisting in the spinal administration of the meningitis serum, being guided by the symptoms of the patient and the condition of the cerebrospinal fluid; the importance of carefully studying the condition of the patient and of the cerebrospinal fluid for indications as to the use of the serum and for varying the dose; the early recognition of complications, such as posterior basic meningitis with closure of the foramina, cannot be too strongly emphasized.

The following is a communication Dr. Park wishes to make:

The Rockefeller Institute for Medical Research has ceased to produce antimeningitis serum and has turned over its two horses to the Health Department. It has sent a circular to those who have used the serum it has produced, stating these facts.

The Health Department has decided to take over the production of the serum and will provide it in much the same way as diphtheria antitoxin. It will be supplied to physicians and, when possible, it will be administered upon their request. It is very desirable that fluid from the spinal canal be obtained in all cases for bacteriologic examination, as many of those supposed to have cerebrospinal meningitis are really cases of tuberculosis or other conditions not due to the meningococcus.

The Department laboratories will gladly examine any specimens of fluid sent to them. The Department, however, will not refuse serum to those who find it impossible to obtain the specimens of fluid. At present there will be no charge in Greater New York. Possibly in the future those who are well-to-do may be charged, as in the case of diphtheria antitoxin.

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REPORT OF A CASE OF PURULENT CEREBROSPINAL MENINGITIS DIAGNOSED DURING LIFETIME OF PATIENT AS DUE TO INFLUENZA BACILLUS.*

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AND

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Assistant City Pathologist, St. Louis, Mo.; Assistant Professor of Pathology,
St. Louis University.

Baby Michael, aged seven months, an inmate of St. Ann's Foundling Asylum, was taken suddenly ill during the night of September 30, 1910, with symptoms of collapse. On my morning visit, on October 1st, my attention was called to the case. The baby lay in dorsal decubitus, low in the bed, the eyes were heavily ringed and sunken, and the whole aspect of the child betokened grave prostration. On physical examination the following points were elicited: At the top of the left apex anteriorly there was a small patch of dullness in the first left intercostal space. The breath sounds over this area were faintly tubular. There was some slight rigidity of the neck, but the fontanel was not fuller than the temperature (105°F.) warranted. By the third day (October 3d) the disease had progressed rapidly. The area of pulmonary consolidation had increased and the breath sounds were now frankly tubular. The fontanel bulged grossly and the neck rigidity was extreme. On attempting to flex the neck Brudzinsky's sign was elicited, but, strange to remark, the contralateral sign was absent. Kernig's sign was well marked. The temperature was 103°F. , and pulse was retarded relatively for the age of the infant.

Lumbar puncture performed by me withdrew 6 or 7 drams of creamy massive cerebrospinal fluid that flowed with difficulty through the canula.

The tentative diagnosis of cerebrospinal or pneumococcal meningitis was made, and the baby was taken to the City Hospital for

* Read before the St. Louis Pediatric Society November 10, 1910.

further treatment. No blood count was made in view of the fact that all types of acute meningitis (including the tuberculous) are associated with a leukocytosis.

The baby died the fourth day after the diagnosis of influenzal meningitis was made by means of cultures and the microscope.

As clinically all types of acute meningitis, except the tuberculous, are symptomatically identical, analysis of the physical signs of the case now reported would be useless. As regards the primary foci of infection, there are many sources reported: Otitis media, pneumonia, acute rhinitis, epiphysitis, have all been reported in the literature. A general infection with the influenza bacillus must also be considered as a possibility in the production of influenzal meningitis, as several observers have been able to grow bacillus from the circulating blood.

Age and Sex.—The disease predominates in infants and young children. Adults seem to possess an immunity. Males, in the cases reported, predominate in the proportion of sixteen to six.

Character of the Cerebrospinal Fluid.—As a rule, it is massive and tenacious, flowing with difficulty through the canula, but cases have been reported of influenzal meningitis in which the cerebrospinal fluid was serous and clear, resembling that met with in tuberculous meningitis.

Prognosis.—Influenzal meningitis postulates a gloomy, but not necessarily a fatal, prognosis, as recoveries have been reported.

Literature.—In Europe, Slavik, of Heubner's Clinic, was the first to identify during life the influenza bacillus in the cerebrospinal fluid of an infant nine months old, suffering from acute meningitis, in 1899. Adams, of Washington, in 1907, laid claim to a like distinction as being the first American who made the diagnosis of influenzal meningitis by culture and microscope.

BACTERIOLOGICAL REPORT.

A thick blood stained purulent fluid was received at the City Bacteriological Laboratory for examination. Smears made of this fluid and stained with methylene blue revealed polymorphonuclear leukocytes in large numbers, and a large number of bipolar bacilli, both intra and extra cellularly. The bipolar characteristic was so marked that some of the bacilli appeared like diplococci. However, stained for capsules, it was found to have none,

and when stained with thionin and a weak solution of carbofuchsin, the bacilli stained solidly.

As a further means of differentiating, the spinal fluid was plated on hemoglobin containing agar, five drops of sterile defibrinated human blood added to each tube of melted agar and inoculated in the usual way. After eighteen hours' incubation, the plates were examined and found to contain a pure culture of small, round, translucent colonies. The colonies were so small that they were almost invisible except with the aid of a magnifying lens. There was no zone of hemolysis and they grew in groups. These colonies were found to be of a short, bipolar, non-motile Gram-negative bacillus. The bipolar characteristic is best brought out with methylene blue; thionin and carbofuchsin staining it more uniformly.

This bacillus refused to grow on other than a hemoglobin containing media. An almost pure culture of this bacillus was also obtained from the nasal mucous membrane of this infant.

With the above characteristics, there was no difficulty in identifying this organism as the bacillus of influenza (Pfeiffer).

Injecting 2 c.c. of a dense suspension from a blood agar slant intravenously into a rabbit, and 5 c.c. of the same suspension intraperitoneally into a guinea-pig and rabbit, it was found to be nonpathogenic to these animals, which is in accord with the findings of most of the investigators of this organism.

Unfortunately, an autopsy could not be obtained on the baby. Because of the difficulty in growing this organism on ordinary media, and from the fact that they do not always appear in smears of the fluid, and that no cultures are usually made in hemoglobin containing media, this organism is often overlooked. The amount of hemoglobin necessary is small; according to Davis it will grow on media containing 1-180,000 of hemoglobin. It also multiplies favorably in cerebrospinal fluid. Cantani contended that the globulins were the necessary constituent for favoring their growth, as he grew them on spermatic fluid and other hemoglobin free fluids, but Ghon has shown that the fluids Cantani used did contain hemoglobin.

403-406 Metropolitan Building, St. Louis, Mo.

DISTURBED FUNCTION OF THE THYROID GLAND. CASE REPORT.*

BY SIDNEY V. HAAS, M.D.,
New York.

Jennie Horwitz, schoolgirl, presented herself in Professor Holt's service at the Vanderbilt Clinic, October 6, 1909. She arrived from Russia three years ago. There are no constitutional diseases in her family.

Her birth was normal. She had measles at eight years. She has always been backward at school and suffers from nocturnal enuresis. Three months ago the adenoids and tonsils were removed. Her diet has been general. For past two or three years the mother has taken the child from doctor to doctor, and from dispensary to dispensary for an indefinite condition which she describes as follows:—

The girl has no appetite, she vomits slightly after each meal, she has pain in the abdomen, is constipated, has headache, tenderness of scalp, redness of conjunctivæ, pain in the eyes and sore throat. This condition is worse at intervals of several months.

Physical examination on October 10, 1909, showed a pale, irritable, crying child, who feared and resisted examination. (The mother stated that of late patient cried upon slightest pretext.) Weight, 73 pounds. Slight exophthalmos, congestion of conjunctivæ were present. The right lobe and the isthmus of the thyroid gland were visibly enlarged and palpable. The circumference of the neck was 27 cm. The scalp was exceedingly tender. The tonsils were large and red. Mammæ were fairly well developed. Chest movements were poor; there was slight dullness at left apex. Respiration, 24. The heart area was enlarged transversely, apex being in fifth space, $\frac{3}{4}$ inch external to nipple line, right border $\frac{1}{2}$ inch to right of sternum; no murmur. Pulse was 124, regular, with slightly increased tension. The abdominal wall was relaxed. There was no pubic or axillary hair. Abdominal organs apparently normal. Knee-jerk slightly increased. Temperature, 99°F.

Diagnosis.—Hyperthyroidism.

Therapy.—Catharsis followed by iron.

* Presented before the New York Academy of Medicine, Section on Pediatrics, February 9, 1911.

October 27, 1909 (three weeks later), weight was 71½ pounds. The symptoms were less marked.

November 8, 1909 (two weeks later).—She had regained 1 pound in weight.

May 23, 1910 (seven months later).—Patient again appeared at the clinic with report that she had felt well until one week ago, when headache, vomiting, constipation and pain in abdomen recurred. A physical examination showed a girl much less excitable. Pulse, 108. Exophthalmos less marked. Weight, 87½ pounds, a gain of 16 pounds in seven months.



Stage of hypothyroidism, showing myxedematous expression.

She was not seen again until October 19, 1910, one year after first coming under observation. Precisely same history was elicited as before. She was well until two weeks ago, when similar symptoms recurred. Physical examination at this time showed a stolid, sluggish, flabby, anemic-looking girl. The adipose layer irregularly, lumpy, especially about abdomen, lumbar region and buttocks. The exophthalmos was less marked.

Pulse, 90. Weight, 95 pounds, a gain of 23½ pounds in the year.

Diagnosis.—Hypothyroidism.

At this time, with the consent of Dr. La Fétra, chief of clinic, I placed the patient in Lebanon Hospital for observation.

Urine and feces upon repeated examinations negative.

Blood.—Erythrocytes, 4,900,000; leukocytes, 11,000; polynuclears, 62 per cent.; lymphocytes, 38 per cent.

Von Pirquet markedly positive.

X-ray of chest showed enlargement of heart; but no enlargement of thymus.

X-ray of Wrists.—Anatomic index = 13 years (Dr. Rotch's scale).

Eye-grounds.—Negative.

Temperature normal throughout, touching 98°F. only upon one occasion.

Pulse ranged around 80.

Respiration ranged around 22.

At present the condition of the patient is better than at any time since coming under observation.

She has in the last few weeks become brighter mentally. Her movements are less sluggish. Her color markedly improved. Expression entirely different. Pubic hair has just appeared. Menstruation has not begun. The irregular fat deposit has disappeared, only a trace remaining, the fat layers being smooth and normal. This despite the fact that she is still gaining rapidly in weight, her weight on February 6, 1911, being 106 pounds, a gain of 34½ pounds, or about 50 per cent., in a little more than fifteen months, whereas the average gain is 15 pounds.

Diagnosis.—A state of balance.

It may be of interest to compare the height and weight of the patient and two sisters, one younger and one older:—

Age.	Height.	Average.	Weight.	Average.
9¾ years	51 inches	(51½)	59 pounds	(64)
12¼ " (patient)	58½ "	(57½)	106 "	(84)
14½ "	61 "	(60½)	98 "	(107)

The case is presented as one of "disturbed function of the thyroid gland" because we have in this one case a picture of

(1) *Hyperthyroidism*, or exophthalmic goiter, with the classical symptoms of (a) exophthalmos, (b) enlargement of the thyroid gland, (c) hyperexcitability, (d) a moderately rapid pulse (120), and (e) loss of weight.

(2) *Hypothyroidism*, or myxedema, (a) mental and physical dullness, (b) rapid increase of adipose tissue in irregular masses, and (c) pallor.

(3) *Stage of balance*—a disappearance of the myxedematous characteristics, even though the weight is increasing.

That other glands are involved as well as the thyroid is

probably true. There can be little doubt that the recurrent attacks of gastrointestinal disturbance were a part of the pathologic condition, since this is not uncommon. The operation upon the tonsils may have been an etiologic factor in the production of the acute exacerbation first observed. I have seen the state of hyperthyroidism with increase in size of thyroid gland follow a tonsillectomy in a woman of twenty-four years, the condition persisting for six weeks before recovery took place.

This case illustrates the fact that many minor disturbances of the thyroid gland are probably unrecognized. At one extreme is found the typical picture of exophthalmic goiter, at the other the equally typical picture of cretinism or myxedema.

Between these extremes must occur all degree of disturbances of the function of the gland, with symptoms so irregular as to make the diagnosis difficult if not impossible.

TREATMENT OF INFANTILE SCURVY.—M. Ostheimer (*ibid*), sums up the treatment in a single word, orange-juice. It is as prompt as mercury in syphilis or quinin in malaria. Drugs are probably without value. Much difference of opinion exists as to feeding during treatment. Some stop all proprietary foods, condensed milk or sterilized milk, and substitute either uncooked milk or milk which is boiled just before it is given to the child. The orange-juice may be given in doses of one tablespoonful or more every two hours. Grape-juice comes next, while lemon-juice is regarded unfavorably on account of its great acidity. It has been found that in nurslings, giving orange-juice to the mother benefited the child; but it is better to give it directly to the child. The latter needs rest and should be handled as little as possible. Fresh air and plenty of water are naturally of benefit. Beef-juice seems to have a doubtful value. Sodium lactate has been advised by Wright, of opsonic fame. Iron, arsenic and cod liver oil may be given late in the disease to infants in whom there is marked secondary anemia or exhaustion. The author thinks that it would be well as a prophylactic measure to give orange-juice to all infants who come under our care after having been on any of the proprietary foods, condensed milks or sterilized milks for any length of time. Such infants ought to be at once placed on an uncooked milk mixture. Recovery with the orange-juice generally ensues in three or four days.—*Medical Record*.

TYPHOID FEVER INFECTION INVOLVING ONLY THE GALL BLADDER.*

BY WALTER G. ELMER, M.D.,
Philadelphia.

The case presented is that of a young girl who was infected with typhoid fever, but who resisted the infection, except for one organ, namely, the gall bladder, and her illness in my opinion was due solely to the cholecystitis. That she was infected with the poison of typhoid fever there can be no doubt, because 11 other patients beside herself, who had been drinking milk from the same dealer, developed typhoid fever in its characteristic form.

My patient—Marion M.—a young girl of perfect physical build and development, sixteen years old, developed a little fever about eighteen days after she had ceased to drink the milk, which we subsequently learned was infected.

On the twenty-second day from the time she stopped drinking this particular milk I saw her for the first time. Her temperature was then $100\frac{1}{2}^{\circ}\text{F.}$, and from her description of the preceding two or three days I concluded she had had a little fever during that time. The next day it reached 103°F. She had had no nose-bleed, no vomiting, no pain in back or limbs, but had not felt well for some two weeks. She had pain in the right side of the abdomen and could not turn over on her right side because it increased her pain. Her heart and lungs were normal; the region of the appendix negative. The edge of the spleen, when a full inspiration was taken, could just be felt, but was very indefinite. The gall bladder could be easily palpated; distended and very tender. The temperature ran an irregular course, with marked daily remissions, reaching 103°F. or a little more in the late afternoons. Pulse from 80 to 100. Leukocytes, 7,000. The patient did not seem sick, was usually hungry, in good spirits most of the time, and had none of the apathy which usually results from the toxemia of typhoid fever. The urine was normal.

On the sixth day of my visits the Widal test was negative.

* Read before the Philadelphia Pediatric Society, January, 1911.

The gall bladder remained distended and tender and caused considerable pain at times, and the patient never turned over on her right side, but turned frequently to the left. The abdomen otherwise remained negative.

On the afternoon of the next day the gall bladder began draining itself, for the distention disappeared, as well as the tenderness, and the patient lay quite comfortably in bed. The temperature reached normal, and I found three typical rose spots on the abdomen, the first that had appeared; and on the following day we obtained a very characteristic clump reaction with a dilution of 1-50. Although the temperature on this day—the eighth day of my visits—reached $100\frac{1}{2}^{\circ}\text{F.}$, it was normal the next morning and remained absolutely at the normal throughout the entire convalescence and the patient was apparently perfectly well.

There can be no doubt that this young girl was infected with typhoid fever. I believe all of her tissues resisted the infection except the gall bladder, where the organism obtained a foothold and set up a cholecystitis, blocking the cystic duct, causing distention, pain and tenderness and eventually a sufficient systemic reaction to cause rose spots and a positive Widal reaction. I do not believe she had ulcerated intestines or involvement of her mesenteric glands and lymphatic system generally.

The complete relief from all symptoms when the gall bladder began draining, and the absolutely normal temperature which began about thirty-six hours later and continued without variation all through the convalescence, and the fact that the patient seemed and felt perfectly well from the time the gall-bladder was relieved, led me to the conclusion that there could be no sloughing intestinal ulcers or extensive lymphatic involvement.

The case was therefore one which presented difficulties in making an early diagnosis, for I knew nothing about the infected milk at that time, and it also presented surgical possibilities, for there was the danger of ulceration and perforation of the distended gall bladder if nature had not been able to bring relief and permit drainage to occur. I was watchful for surgical indications, but felt warranted under the circumstances in assuming some slight risk until the symptoms demanding relief had become very urgent. Fortunately, that point was not reached, and my patient recovered so quickly and completely that in a very short time I permitted her to be up and about and on quite a liberal diet.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, Held February 9, 1911.

DR. WILLIAM SHANNON, CHAIRMAN.

MULTIPLE ABSCESES IN ONE KIDNEY IN A CHILD.

DR. JOHN DOUGLAS presented a child, seven years of age, who was admitted to St. Luke's Hospital on November 15, 1910. The family history was negative. During the past three months the girl complained of headache, lassitude, slight fever and loss of appetite. She lost weight. During the past month she complained of pain in the right side on exertion, especially when climbing stairs or making unusual muscular exertion. She complained of pains at times on urination, but had passed no gravel, stones or blood. The urine was occasionally cloudy.

Two days before admission to the hospital she began to vomit and had severe abdominal pain. The following morning she had a chill which lasted fifteen minutes. This was followed by a high fever. The bowels were moved by glycerin suppositories; no blood was found in the stools.

On admission the temperature was 103.4°F. and pulse 144, with respirations 40. There was a high total and polymorphonuclear leukocyte count. On the right side of the abdomen was found a tender mass; it was situated slightly above the umbilicus. Over the mass was a dull tympany. It was thought that she had a high retrocecal appendicular abscess, although a suppurative kidney lesion was considered.

Dr. Douglas made a high intermuscular incision over the mass; a markedly thickened appendix presented itself, and this was rapidly removed. The mass proved to be the right kidney, two or three times the normal size, and it was studded with necrotic abscesses which varied in size from a pin-head to a centimeter in diameter. There were more than forty of these abscesses. The pelvis of the kidney was distended and held about 100 c.c. of cloudy urine. Nephrectomy was performed. The temperature fell rapidly after the operation, the urine became normal and there was no subsequent infection of the wound and the child was discharged cured at the end of three weeks.

This case was of interest on account of the patient's age and the possible hematogenous infection of the kidney occurring in a child who had not had previously some acute infection, as an etiologic factor. The previous history of the case was also of interest, as it would seem to indicate that there might have been a displacement of the kidney with perhaps intermittent hydro-nephrosis, the displaced kidney being in a position where it was subject to traumatism, an etiologic factor in acute hematogenous infection of the kidney. On the other hand, while the macroscopic appearance of the specimen, showing numerous hemorrhagic areas studded with miliary abscesses, seemed to indicate a hematogenous infection, the dilated pelvis, together with the previous history of a cystitis, fever, malaise and lumbar pain would point to the probability of the lesion being the result of one of those cases of pyelitis due to colon bacillus infection which quickly subsided under treatment with urotropin. After the nephrectomy the urine rapidly became normal. The pathologic examination of the specimen had not cleared up the point concerning the route of infection, whether ascending or hematogenous.

A CASE OF DISTURBED FUNCTION OF THE THYROID GLAND: HYPERTHYROIDISM AND HYPOTHYROIDISM IN A GIRL TEN YEARS OF AGE.

DR. SIDNEY V. HAAS presented this patient. (See p. 213.)

A CASE OF STREPTOCOCCUS INFECTION IN A CHILD TWO YEARS OLD.

DR. MAURICE OLIVER MAGID asked for an expression of opinion regarding this case. The patient was a boy two years of age. He was suddenly taken ill with vomiting and severe pains in the abdomen, and this was after he had eaten sausage. He had a temperature of 104°F. and marked rigidity on the right side of the abdomen. He was carefully watched for a day and then was sent to the hospital with a diagnosis of possible appendicitis. The following day he was operated on. A normal appendix was found, but the peritoneal cavity was found to be filled with pus and streptococci. He did not know just what the cause of the peritonitis was. No postmortem was obtained.

NOTES FROM THE CHILDREN'S SERVICE IN THE PRESBYTERIAN HOSPITAL, WITH EXHIBITS.

DR. WILLIAM PERRY NORTHRUP gave details of the newer equipment and inventions in the Children's ward of the Presby-

terian Hospital. (An article on this subject will appear shortly in the ARCHIVES.)

A COLLECTED STUDY OF 60 CASES OF, AND CONDITIONS SIMULATING, MENINGITIS, WITH SPECIAL REFERENCE TO DIAGNOSES.

(For this paper, see p. 201.)

DR. WILLIAM H. PARK, in discussing Dr. Sophian's paper, said there was one aspect of the paper he wished to dwell upon. All were trying to find the exciting factor in these cases of meningitis, the bacillus causing it in these young children. Very favorable findings came from the laboratory; Dr. Hemenway had found in 40 consecutive cases that the majority of them were due to the meningococcus and not to the tubercle bacillus. This certainly was of interest. He hoped that the mass of information which was so much desired would soon be collected; the Health Department Research Laboratory was working to bring about the best results.

DR. HENRY KOPLIK brought out in his discussion some clinical points of value, especially in making a diagnosis of meningitis from certain other conditions. During an epidemic of poliomyelitis it was a simple matter for an experienced man to recognize the disease; but when there was no epidemic he did not know of any disease more difficult to diagnose; this was, of course, a very serious matter. Again, in the cases referred to it was a mistake to make such hopeless prognoses; in many of these cases in four or five weeks the patients were perfectly well.

In making a diagnosis a very important and valuable aid was to inquire carefully into the mode of onset. There seemed to be some difficulty in getting a history of an acute onset in tuberculous meningitis; if one could get an absolutely reliable history of an acute onset tuberculous meningitis could be excluded. The history of an acute onset or a gradual one could not be sufficiently emphasized; then the clinical signs should be inquired after and the case carefully studied before a positive diagnosis was made.

The point regarding cytology as giving diagnostic evidence in cases of meningitis he did not think was well taken. If one found the microorganism of the disease, all right. The work of Dr. Sophian and of Dr. Hemenway was taken in a very painstaking way, and he hoped that they would soon be able to give them a method by which the finding of the tubercle bacilli could be made more easy.

DR. WILLIAM P. NORTHRUP said that the American Pediatric Society had offered a prize for the person who would give it four of the best early diagnostic symptoms of the disease under discussion; nothing came of it. Tuberculosis of the choroid had been described; Dr. Northrup had been looking for such a condition for twelve years and had not been able to demonstrate it postmortem.

DR. HENRY HEIMAN said that a diagnosis should be made by exclusion. The parents should be informed of the value of lumbar puncture and that an examination of the fluid might reveal, and often would reveal, the condition. With regard to the cytology, if they found 100 per cent. leukocytes there then was a possibility that they were dealing with tuberculous meningitis.

In the pyogenic form of meningitis the time should be taken into consideration; if the patient was ill but one week or ten days a diagnosis of pyogenic meningitis should be made. If they were ill beyond this time then a diagnosis of cerebrospinal meningitis should be diagnosed.

DR. CHARLES E. NAMMACK recalled Dr. Hemenway's report, in which the tubercle bacillus was recognized 135 times in a series of 138 cases of meningitis; this certainly showed very good laboratory work.

DR. SIDNEY V. HAAS referred to cases of acute intestinal intoxication which gave rise to the classical symptoms of acute meningitis, a condition that was more common than generally supposed. At the Lebanon Hospital 4 cases had recently been sent in with the diagnosis of cerebrospinal meningitis which were found to be cases of intestinal intoxication. Therefore, one should be more careful and examine for the presence of acetone and diacetic acid in the urine. Many years ago he had had demonstrated to him a case of tuberculosis of the choroid.

DR. ABRAHAM SOPHIAN, closing the discussion, said that in many cases lumbar puncture was a necessity, especially in the atypical cases.

THE SUBSEQUENT HEALTH OF CHILDREN WHO DRANK MILK CONTAINING TUBERCLE BACILLI.

DR. ALFRED FABIAN HESS read this paper. Three years ago he reported on the examination of the milk of New York City as

regards the frequency with which it contained tubercle bacilli. He found that of 107 specimens examined 17 contained virulent bacilli, that was to say, 16 per cent. He found, however, that the children who drank this milk were at that time in no definite way affected. He now reported upon the further health of these children, having observed them very carefully for this period. These children, 18 in number, it should be noted, drank milk in which tubercle bacilli were found, and may have drank it at different times, but certainly were not exposed to this infection subsequently to this time, as the mothers were warned to boil the milk after this danger had passed. Dr. Hess found of these 18 children one had developed tuberculosis of the cervical glands, from which he cultivated a bacillus which proved to be of the bovine type, as tested by its virulence for rabbits and its cultural growth. The other 17 children were of about the average health, and did not show any bad effects from their exposure. At the time they drank the milk almost all of them were below two years of age.

Another point Dr. Hess brought out, as the result of experiments on guinea-pigs, was that frequency of infection as well as the dose of bacilli was of great importance. He showed that although these animals could not be affected by taking 2 mg. of tubercle bacilli in milk by mouth, when the material given was in one dose they could be infected with less than this amount, if it were divided into ten, twenty or thirty doses given upon as many days. He reasoned by analogy that it made a difference whether children took a small amount of tubercle bacilli in one dose or on successive days.

Another interesting point Dr. Hess brought out was the necessity of providing a safe butter. It was striking that they were afraid to give children milk containing tubercle bacilli, but that they were not afraid to give children between the ages of one and two years butter containing large numbers of these organisms. There should be a means for providing a safe butter, just as there was now a way of obtaining a safe milk. It would seem practical if through the efforts of the certified milk commissions they were enabled to purchase a certified or a pasteurized butter; at any rate this was a timely subject for consideration by those commissions who had effected such excellent results as regards the milk supply.

THE PHILADELPHIA PEDIATRIC SOCIETY.

Tuesday, January 10, 1911.

CHARLES A. FIFE, M.D., PRESIDENT.

DIPHTHERIA.

DR. COURTLAND Y. WHITE gave an extensive résumé of the methods employed by the laboratory of the Board of Health of the city of Philadelphia in the investigation of diphtheria.

DR. A. A. CAIRNS read a statistical report upon diphtheria in Philadelphia during 1909 and 1910 from the office of the Bureau of Health. He said that 3,878 cases were reported during 1909, and 3,804 cases during 1910. Of these 512, or 13.2 per cent., died in 1909; 492, or 12.93 per cent., in 1910. In 1909, 2,329 cases were removed to the Philadelphia Hospital for Contagious Diseases, 60 per cent.; in 1910, 2,235, 58.75 per cent. Of these 243, 10.43 per cent., died in 1909; 203, 9.08 per cent., in 1910. After the removal of cases to the Philadelphia Hospital for Contagious Diseases, when no immunization was done, 43 (1.85 per cent.) cases occurred secondarily in 1909; 87 (3.08 per cent.) secondary cases in 1910. 1,320 cases were treated at home during 1909; 1,368 during 1910. Where antitoxin was used in the treatment of cases at home, 172, or 13.03 per cent., died in 1909; 203, or 14.83 per cent., in 1910. In 1909, 77 secondary cases occurred among cases treated at home with antitoxin, but where no immunization was done, in 1910, 60, or 4.38 per cent. In 1909, 229 cases were treated at home without antitoxin, 97, or 42.35 per cent., of whom died; in 1910, 201, 86, or 42.78 per cent., dying. Among these cases treated at home, without antitoxin or immunization, 63, or 27.51 per cent., of secondary cases occurred in 1909; 45, or 22.38 per cent., in 1910. The days of death of cases which died when no antitoxin had been given were as follows: In 1909, 1 case of the first day of illness; 22 on the second; 27 on the third; 11 on the fourth; 7 on the fifth; 6 on the sixth; 7 on the seventh; 3 on the eighth, ninth and tenth; 2 on the eleventh; 1 on the twelfth, and 4 on the thirteenth day. During 1910 7 died on the first day; 16 on the second; 21 on the third; 15 on the fourth; 5 on the fifth; 6 on the sixth; 2 on the seventh, eighth and ninth; 4 on the tenth; 1 on the thirteenth; 3 on the fifteenth, and 1 on the nineteenth and thirty-second days.

The following table shows the diphtheria statistics since 1888. The free dispensing of antitoxin began in 1896:—

Year.	Cases Reported.	Deaths.	Case Death Rate.
1888	1,170	623	53.25
1889	1,455	727	49.97
1890	1,820	943	51.81
1891	3,251	1,362	41.89
1892	5,051	1,707	33.79
1893	3,471	1,159	33.39
1894	3,608	1,396	38.69
1895	3,351	1,020	30.4
1896	3,191	862	27.0
1897	5,405	1,231	22.7
1898	4,415	898	22.6
1899	4,161	849	20.4
1900	4,995	898	20.0
1901	3,578	525	14.6
1902	2,444	436	17.7
1903	3,043	521	17.1
1904	3,456	542	15.6
1905	3,238	452	13.9
1906	3,707	546	14.7
1907	3,840	509	13.25
1908	3,863	498	12.89
1909.	3,876	512	13.89
1910	3,804	492	12.93

DR. THEODORE LE BOUTILLIER said that we have all enjoyed hearing the methods employed by our Board of Health. He had gone down to the laboratory and his visit soon made plain to him what excellent work was being done there. Every physician who takes the trouble to visit the laboratory cannot help but be impressed with the thoroughness with which the work is done.

DR. SAMUEL MCC. HAMILL said that he regretted that the speakers of the evening had not thrown some light upon the handling of cases of nasal diphtheria. In his experience the bacteriologic study of cases of nasal diphtheria had been most unsatisfactory. In an epidemic occurring in the infant ward of St. Vincent's Home, the cases were cultured by a representative of the Department of Health, as a result of which only about one-third of the cases were proven positive. The remaining cases

were cultured daily by the resident physician, and as positive results were secured the cases were removed from the ward. In one case which was diphtheria, as far as one could judge from the clinical manifestations, ten examinations were made before a positive result was obtained. The positive culture was a pure culture of an organism which was morphologically similar to the Klebs-Loeffer bacillus. The reason that a positive result was finally obtained and the culture pure, was that Dr. Butler, in examining the nasal passages, located an extremely limited membrane from which the culture was made. There was no question about the virulence of the organism found in these cases, inasmuch as several cases of pharyngeal diphtheria occurred amongst the nurses and attendants working in this ward. Dr. White's statement regarding the frequency with which the first culture in pharyngeal cases proved negative is entirely in accord with Dr. Hamill's experience. He recalled a case occurring a few years ago in which six cultures were made before positive findings were obtained. Thereafter positive cultures resulted from each inoculation.

DR. E. E. GRAHAM said that the physicians of Philadelphia always relied on the laboratory of the Board of Health, believing that accurate work was done there. He asked why the death rate from diphtheria in the larger cities in the United States was greater than in many of the larger European cities. Dr. Cairns has just told us that the death rate of New York was 38, in Philadelphia 32, in Boston 22 per 100,000, while in Berlin it was 15 and in Paris 6 per 100,000. He always thought that antitoxin was used as freely in the United States as it was in Europe. The death rate, according to Dr. Cairns' figures, at the Municipal Hospital during the past two years from diphtheria was 10.43 per cent. and 9.8 per cent. During the same period the death rate for cases treated at home, to whom antitoxin was given, was 13.3 per cent. and 14.83 per cent. This certainly speaks volumes for not only the early but repeated administration of antitoxin. The cases treated at the Municipal Hospital are the worst cases, and yet under immediate and repeated doses of antitoxin they show a smaller mortality than the cases treated at home, that are also given antitoxin. I believe the reason for this is that patients at home are often given only one dose of antitoxin. The mortality during the years 1909 and 1910 of patients treated at home without the administration of antitoxin is, according to Dr.

Cairns' statistics, over 42 per cent. This mortality rate is interesting for a number of reasons. In the first place, there is no doubt that this is a much greater mortality rate than actually exists, and this discrepancy can be explained only by the fact that many cases of diphtheria are so mild that the physician does not report them, the neglect to report them being due to carelessness or the wish to protect the family from the inconveniences of having the house placarded. The case that is so dangerously ill that it may die must be reported, hence the unnatural death rate of 42 per cent. Many of those cases that receive no antitoxin and end fatally live so many days after the onset of the disease that antitoxin would almost surely have saved their lives. Some of the other statistics reported by Dr. Cairns are also interesting. Taking the years before 1896 the death rate was always 25 per cent. and over. Since 1896, when antitoxin was used for the first time by the Board of Health, the mortality has been invariably 22 per cent. or below 22 per cent., and since 1901 has averaged about 15 per cent. These figures, extending over a period of a number of years, should convince the most skeptical of the most positive curative influence that free antitoxin exerts.

DR. ROBERT S. MCCOMBS said that cases of diphtheria could easily be spread among children waiting their turn in the various hospital dispensaries.

DR. HARRY LOWENBURG spoke of a case in which he sent a culture in late Thursday night. The police failed to send it to the laboratory until Friday, too late for the day's examination. It was examined Saturday morning, and Dr. Lowenburg only received his post-card telling that it was positive on Monday morning. His report of the case, therefore, only reached the authorities on Tuesday. He objects to the possibility of such delays occurring. He had given antitoxin at once and the child was practically well when the case was reported. He also stated that he always expects, and invariably encounters, an antitoxin rash ten days after administering the antitoxin. He believes that the city authorities ought to provide antitoxin globulins free from serum, in order to avoid rashes.

DR. WHITE added that even the laboratory man may make mistakes. The greatest amount of "kicking" refers to the nasal cases. Yet so many germs occur in the nose which resemble diphtheria bacilli that mistakes must occur. Delays in bringing

in cultures rarely happen. Dr. White hopes that the Department of Health will soon be able to get up concentrated antitoxin in syringe form, ready for anyone to administer. Antitoxin rashes have been very rare this winter. As the pseudodiphtheria bacilli cannot be distinguished from true diphtheria bacilli by culture alone, the germs must be isolated, inoculated on special agar and later into a guinea-pig.

DR. CAIRNS said that his medical inspectors were ready to give antitoxin, immunize and urge the use of antitoxin in all cases. As delays occur when the attending physician asks the medical inspector to give the antitoxin, Dr. Cairns advocates preparing the antitoxin in syringe form. The Board of Health will only give one injection of antitoxin, as Dr. Cairns will not allow the medical inspectors to give a second dose, since that would be treating the case and encouraging patients to remain at home, thus defeating the object for which the Philadelphia Hospital for Contagious Diseases was erected. When the medical inspector has given the first dose of antitoxin, the case remaining at home, there is ample time for the attending physician to prepare himself for administering further doses of antitoxin if the cases need them. It is never necessary to await a positive culture before reporting clinical cases of diphtheria or giving antitoxin.

The President, Dr. Fife, then read the Annual Address.

TREATMENT IN CASES OF PYLORIC OBSTRUCTION.—J. F. Wilkinson (*The Australian Medical Journal*, August, 1910). After describing a number of cases of pyloric obstruction in which operation was either inadvisable or was refused, Dr. Wilkinson expresses the opinion that unless pyloric obstruction is very decided gastroenterostomy is not the best treatment. He admits that many cases will ultimately come to operation, but he thinks that then the obstruction will be very complete and that the surgeon will get better results than he frequently does in cases in which the obstruction is far from complete. The treatment Dr. Wilkinson recommends is directed to the checking and neutralizing of the hyperacidity, partly by drugs and partly by such dietetic and hygienic methods as will tend to lessen the secretion of acid, and particularly he recommends that rest be given to the stomach by emptying it and washing it out as late at night as possible.—*Medical Chronicle*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. CHARLES E. FARR.	DR. B. RAYMOND HOOBLER.
DR. S. FELDSTEIN.	DR. C. D. MARTINETTI.
DR. R. S. HAYNES.	DR. M. NICOLL, JR.
DR. FRITZ B. TALBOT.	

PATHOLOGY.

LUST, F.: THE VISCOSITY OF THE BLOOD OF THE INFANT IN HEALTH AND DISEASE. (*Archiv. für Kinderhk.*, Vol. LV., p. 277.)

With practice and care the method of Hess yields reliable results. The average viscosity was 3.8. In the newborn the viscosity is notably high. Between the ages of one and one-half and eleven years the viscosity was about 4.1. Anemic babies have a lower viscosity. Yet there is no constant parallelism between the viscosity and the amount of hemoglobin. All conditions producing cyanosis raise the viscosity. The high figures found in pneumonia are probably due to a combination of factors. There exists an intimate connection between the viscosity and the amount of water in the blood; the more water, the lower the viscosity. Transient changes in the blood, such as ingestion of carbohydrate foods, are quickly reflected by the viscosimeter. Introduction of salt solution intravenously or subcutaneously has a marked effect in reducing the viscosity. Acute and chronic nutritional disturbances produce no notable changes in the viscosity unless there occurs loss of water from the tissues. S. FELDSTEIN.

SURGERY.

MOSCHCOWITZ, ALEXIS V.: TREATMENT OF UNDESCENDED TESTIS. (*Annals of Surgery*, December, 1910.)

Moschcowitz, after an extensive review of the anatomic varieties and the surgical anatomy, gives the following reasons for operating: (1) Every undescended testis is accompanied by a hernia, actual or potential. The application of a truss is either impossible or painful. (2) Trauma is more common. (3) The testis should be preserved to maintain the sexual characteristics, and (4) if possible to maintain the spermatogenetic

function. (5) Malignant tumors not infrequently develop. (6) The testis may be destroyed by torsion of its cord or by strangulation by the pillars of the external ring. (7) Gonorrhea and metastatic mumps are very grave and even fatal in this condition. (8) The psychic depression in adult years is very marked.

The author operates on all cases after three years and has tried all the various methods, from massage to orchidectomy. He has finally settled on the Bevan operation, the essential feature of which is the ligation and division of the spermatic vessels. He reports twenty-two operations on 18 patients with perfect results in every case except one, in which the atrophy became more marked than it was at operation.

CHARLES E. FARR.

SCHIPPERS, J. C.: CLINICAL EXPERIENCE WITH 676 CASES OF TRACHEOTOMY. (*Jahrb. für Kinderhk.*, November 1, 1910, p. 636.)

The cases included 385 males and 291 females. The largest number of cases occurred between the ages of two and three. The total mortality was 27.53 per cent. There are included in this series 566 cases of diphtheritic laryngitis. The mortality in these cases was only 20.94 per cent. The presence or absence of previous pulmonary complications is of great significance. In the former the mortality was 40 per cent., in the latter only 18.31 per cent. The average number of days that the tube was kept in the trachea varied from 5.8 in 1899 to 3.6 in 1908. In the uncomplicated cases the duration of the nursing period was about three weeks.

As a result of this study, the author thinks that tracheotomy yields equally as favorable results as intubation.

S. FELDSTEIN.

DEAVER, H. C.: APPENDICITIS IN CHILDHOOD. (*Journal of American Medical Association*, December 24, 1910.)

H. C. Deaver reports 500 cases under sixteen years of age, with 23 deaths (4.6 per cent.)—males, 315; females, 185. Youngest patient twenty-one months old. Number of cases under five years, 40; from six to ten years, 180; eleven to fifteen years, 280. Acute cases, 403; chronic, 97. Local peritonitis with abscess, 243; general peritonitis, 12; diffuse peritonitis, 43. Cause

of death: general peritonitis, 12; pneumonia, 2; uremia, 2; subphrenic abscess, 2; perisplenic abscess, 1; secondary hemorrhage, 1; gangrene of spleen, 1; gangrene of ileum, 1; intestinal obstruction, 1. Sixteen cases of intestinal obstruction with one death.

He concludes (1) that appendicitis in childhood increases in frequency from birth to puberty and is more common in males. (2) It runs a rapid and severe course more often than in adults. Strictures are rarer, but fecal concretions are more common. (3) Enteric, intestinal catarrh and influenza may predispose. (4) In infants the symptoms are often scanty, irregular and misleading. The disease is more frequent than is generally believed. In older children acute attacks occur even more suddenly and stormily than in adults. Chronic appendicitis represents a focus of chronic autotoxemia. (5) All cases of abdominal trouble in children should be regarded as appendicitis until proved otherwise. The differential diagnosis must be made from intestinal catarrh or worms, right-sided pneumonia or sacroiliac disease, twisted ovarian cyst, mesenteric cysts, cystitis and rectal abscess. (6) The prognosis is favorable in early cases, the mortality being practically *nil* if the case is operated on within twenty-four hours. After this time the prognosis rapidly grows worse. In chronic cases a severe acute attack is always to be feared. (7) Non-operative treatment is temporarily indicated in cases of diffuse peritonitis with localizing abscess. Opium and purgatives are absolutely contraindicated in all cases. (8) Operation is even more suitable for children than for adults. (9) Post-operative treatment is highly important. The Fowler position must not be used for more than thirty-six hours in drainage cases lest intestinal obstruction develop. (10) Intestinal obstruction begins with sudden severe pain, becoming paroxysmal, and by nausea, spitting up and vomiting. The temperature and pulse are of little significance in these cases. In the presence of numerous adhesions ileocolostomy is the best procedure. (11) Secondary abscess must be carefully watched for. It is revealed by a rise and continued elevation of temperature, with high leukocyte count and local signs. (12) Drainage is used only when the exudate is purulent or in large quantity. It produces adhesions and predisposes to intestinal obstruction. A wet dressing is the best for absorption.

CHARLES E. FARR.

OCHSNER, EDWARD H.: THE PROGNOSIS IN CONGENITAL DISLOCATION OF THE HIP. (*The Journal of the American Medical Association*, October, 1910.)

Ochsner reports 31 cases, 17 single and 14 double. He secured anatomic and functional cures in 100 per cent. of the single dislocations in those under eight years of age, by the Lorenz method. In the 14 double dislocations below the age of six, 71 per cent. were cured and 4 cases still in casts were in good position. Those above six years in the double dislocations or eight years in the single dislocations gave much poorer but yet very fair results. The author concludes (1) that too great force should never be used, especially suddenly; (2) reduction should be accomplished by bringing the head over the posterior rim of the acetabulum rather than around the lower border; (3) a hip once reduced should never be reluxated; (4) the hamstring tendons should not be stretched at the time of reduction, as they are a great help in keeping the head in position; (5) the cast should be applied over stockinette and not over glazed cotton; (6) the cast should be applied with the thigh abducted and flexed to a right angle and should be only changed once during the next year.

CHARLES E. FARR.

MEDICINE.

QUEST, ROBERT: ON THE ETIOLOGY OF THE SPASMODIC DIATHESIS. (*Monats. für Kinderhk.*, 1910, Vol. IX., No. 1, p. 1.)

The association of spasmodic seizures (tetany and convulsions) with disturbances of nutrition, especially rachitis, has long been recognized. More recently this association has been attributed to the faulty metabolism of certain mineral salts, especially lime and phosphorus. It is shown by chemical analyses of the human brain and by experiments on animals that there is an increased excitability of the cerebral cortex associated with diminished lime salt content. This diminution may be artificially produced by giving food poor in lime, and also by the removal of the thyroid, thymus and parathyroid, such subjects being prone to convulsive seizures. Clinically, the condition is produced by malassimilation of food containing lime. Overfeeding with full milk is also shown to be a cause of tetany. In the latter case the

excess of fat forms lime soap in the intestines and prevents the proper assimilation of the needed salt.

Cod liver oil in combination with phosphorus tends to prevent the latter process, and is for this reason useful in spasmodic conditions.

Diets poor in fat are recommended in the general treatment. In exceptional cases not otherwise benefited the injection of lime salts is worthy of trial.

M. NICOLL, JR.

STOLL, HENRY F.: THE DIAGNOSIS OF TUBERCULOSIS OF THE BRONCHIAL GLANDS. (*American Journal of Medical Sciences*, January, 1911, p. 83.)

Since pulmonary tuberculosis is almost always secondary to tuberculosis of the bronchial glands, often taking months, or even years, to show itself, the author thinks more study should be devoted to diagnosis of bronchial gland tuberculosis.

He quotes Wollstein as finding, in 74 per cent. of her cases, the seat of the primary lesion to be in this group of glands.

The symptoms of this insidious disease are due in part to absorption of the toxins of tubercle bacillus and in part to glandular pressure upon surrounding tissues.

The writer gives the following symptoms:—

A. Due to toxic absorption:—

- (1) Poor appetite.
- (2) Fatigue, especially in the morning.
- (3) Languor.
- (4) Irritability of temper.
- (5) Irregular pyrexia.

B. Due to glandular pressure:—

(1) Early pain of indefinite origin in chest, substernal or mammary region.

(2) Husky voice.

(3) Expiratory stridor of infants rarely heard after the fourth year and often taken for laryngeal croup, from which it may be distinguished by the fact that the voice is never lost in bronchial gland enlargement.

(4) Typical, "brassy," paroxysmal cough dependent upon pressure of swollen glands on vagus nerve.

B. RAYMOND HOOBLER.

SCHABAD, J. A.: LIME METABOLISM IN TETANY. (*Monats. für Kinderhk.*, 1910, Vol. IX., No. 1, p. 1.)

Schabad takes a different view to that cited by Quest, and concludes, from a chemical study of a series of cases of normal and rachitic children with and without tetanic complications, that lime and phosphorus metabolism does not differ in simple rachitis from that complicated with tetany.

That the administration of cod liver oil and phosphorus benefit the rachitis, and as a result the tetany. The lime absorption and the electrical excitability going hand in hand with improvement in the general condition, he concludes that the relation between lime storage and the occurrence of tetany has not been proven.

M. NICOLL, JR.

MARSHALL, H. W.: PRINCIPLES UNDERLYING THE STUDY AND TREATMENT OF CHRONIC ARTHRITIS. (*Boston Medical and Surgical Journal*, 1910, Vol. CLXIII., p. 973.)

There are many causes of chronic arthritis; this disease must be considered a symptom of many diseases rather than an entity. Common diseases of other organs and defects of personal hygiene may be the underlying cause. The severe and mild types of chronic arthritis differ only in their severity. Treatment should be started as early as possible, before any permanent damage is done, and it depends upon the habits of the patient. The writer would have us prevent the disease, because when once established cure is difficult.

FRITZ B. TALBOT.

DELÉARDE, A., AND PAQUET, ANDRÉ: GENERALIZED EMPHYSEMA OF PULMONARY ORIGIN IN NON-TUBERCULOUS CHILDREN. (*L'Echo Med. du Nord*, July 17, 1910, p. 349.)

A case is described in full which followed diphtheria of the pharynx and larynx, but not intubated, which terminated fatally. The underlying causes of this complication, which occurs generally in young children, are any pulmonary conditions which unduly raise the intra-alveolar pressure, especially whooping-cough, bronchopneumonia, convulsions and laryngeal diphtheria, or, again, wounds of the trachea, as in intubation. A few cases have occurred in which the mechanical factor is not present, and these can only be explained by the occurrence of perforation in air vesicles caused by the weakening of the walls by the extension

of an inflammatory process to them, as bronchitis, bronchopneumonia, etc. The prognosis is not hopeless and depends on the nature of the underlying cause. Treatment should be directed toward lessening the escape of air into the tissues by the free use of sedatives and to sustaining the heart, whose action is greatly encumbered by pressure.

M. NICOLL, JR.

METTLER, A.: MELENA NEONATORUM. (*Corriere Sanitario*, February, 1909.)

A case of melena neonatorum is reported cured entirely with one injection of 10 per cent. gelatin. Similar cases are reported by Zuppinger. Perfect sterility of the solution is, of course, necessary, for cases of tetanus following this treatment have been known.

C. D. MARTINETTI.

NOBÉCOURT AND TIXIER, LEON: CLINICAL OBSERVATIONS ON PURPURA. (*La Pédiat. Pratiq.*, June 25, 1910, p. 288.)

Four cases of idiopathic purpura are described in much detail, together with autopsy findings in the fatal cases, blood and bacteriologic examination.

With our present knowledge it is not possible to classify the various types of purpura, which blood examinations would tend to show is not a blood disease *per se*, but a toxi-infectious process, as is evidenced by the invariable presence of a polynuclear leukocytosis, arthropathies and endocardial complication. Blood cultures in the cases cited proved negative.

M. NICOLL, JR.

MORSE, JOHN LOVETT: ACUTE POLIOMYELOENCEPHALITIS (INFANTILE PARALYSIS). (*Boston Medical and Surgical Journal*, 1911, Vol. CLXIV., p. 41.)

An excellent summary of our present knowledge of the subject, giving a brief survey of the different manifestations of the disease, and the writer's opinion as to the proper method of treatment. He believes that hexamethylenamin should be given to all children who may possibly have been exposed to the disease. Local applications are useless and make the patient uncomfortable. Electricity and massage should be avoided in the early stages of the disease and should not be begun until at least six weeks after the onset of the paralysis or three weeks after the cessation of

pain and tenderness. Strychnia should be avoided in the acute stage of the disease. A very important part of the treatment is the prevention of contractures.

FRTZ B. TALBOT.

RIETSCHER, HANS: ETIOLOGY OF SUMMER DIARRHEA IN INFANTS. (*Monats. für Kinderhk.*, 1910, Vol. IX., No. 1, p. 39.)

By placing a number of infants in overheated rooms it is shown that a certain number of individuals are especially susceptible to the heat, showing a very rapid rise of body temperature, while others remain unaffected. Those with a tendency to intestinal disturbance are especially sensitive. It is believed that the heat of summer itself, especially that of the living-room, is a very important direct factor in the causation of this disease, the increased body temperature leading to secondary involvement of the intestines. The writer is unable to arrive at definite conclusions as to the importance of infected milk in causing summer diarrhea.

M. NICOLL, JR.

MEINICKE: RESULTS OF THE EXPERIMENTAL INVESTIGATIONS OF ACUTE EPIDEMIC POLIOMYELITIS. (*Deutsch. Aerzte-Zeit.*, November 15, 1910, p. 506.)

A synopsis of the work of Flexner and Lewis, Leiner and Wiesner, Römer, Levaditi and Landsteiner.

FRTZ B. TALBOT.

MAIR, W.: ENLARGED THYMUS AND SUDDEN DEATH. (*The Medical Chronicle*, January, 1911, p. 216.)

A very readable article discussing the symptoms and the pathogenesis of this condition and reporting 2 cases. Mair discards the pressure theories, reasoning that by any of them death which occurs from cardiac failure should occur from asphyxia. Paltauf's theory finds most general acceptance. This is that there is a constitutional affection underlying an enlargement of all lymphatic structures, of which the thymus is one, and that this general condition causes death. Why this should be is still unsettled. Probably there is an error of metabolism leading to the formation of substances which depress the heart. An internal secretion, not however specifically heart depressing, has been found in the thymus. This and the occurrence of an enlarged thymus in Addison's disease and exophthalmic goiter suggests an association of

these conditions with a general affection of the organs of internal secretion, and that sudden death after operation on the thyroid may be similar to sudden so-called "thymus death."

Two cases are reported. The first died while straining at stool. In this case there was a marked degeneration of the heart muscle, which the author thinks may throw some light on the pathogenesis of the disease. The second case was a typical one, occurring after ethyl chlorid anesthesia. In neither of these cases was there found any evidence of degenerative changes in the germ centers of lymphoid tissue described by Blumer.

Mair finds lymphatism not an uncommon finding and present when other causes of death have operated. He feels that one is no longer justified in giving enlarged thymus as a cause of death unless a very careful search has shown no other cause of death.

R. S. HAYNES.

LEMAIRE, DE MOLARD AND LAFFONT: A CASE OF CONGENITAL QUARTAN MALARIA. (*Annal. de Med. et Chirurg. Infant.*, November 15, 1910, p. 704.)

The examination of the blood of the baby, which they believe contracted quartan malaria from the mother's blood, at fifty-five days of age, showed: reds, 2,202,000; whites, 6,650; hemoglobin, 35 per cent.

FRITZ B. TALBOT.

BELFADEL, A. ALY: KEROSENE POISONING. (*Gaz. degli Osped.*, September, 1908.)

A child eighteen months old drank about 100 grams of kerosene. After five hours he became cold, respirations 60, hard, tense pulse, 48 beats. Slight clonic convulsions. Scanty red urine with strong aromatic odor. Pupils reacted very little. After two days condition improved. Somnolence and constipation persisted for some days.

C. D. MARTINETTI.

AVERAGNET AND TIXIER: CURABLE FORMS OF ACUTE TUBERCULOSIS IN THE INFANT. (*Annal. de Med. et Chirurg. Infant.*, December 1, 1910, p. 725; December 15, pp. 761-784.)

The writers divide acute tuberculosis in infancy into (1) the rapidly fatal forms under which are included miliary tuberculosis, tuberculosis of the meninges and of the peritoneum. The

location of the former may be more in one part of the body than another; for example, in the lungs. They draw attention to the fact that subacute pulmonary tuberculosis is not a disease of infancy, but of second childhood. (2) Under curable forms of tuberculosis are included (a) localized forms of bones (b) of the kidney, spleen, etc., (c) that of apparent localization as in the glands.

FRITZ B. TALBOT.

TONNEL: INTRADERMAL CULTURE. (*L'Echo Med. du Nord*, July 3, 1910, p. 325.)

A discussion of the value of the so-called fixation abscess as a means of diagnosis, prognosis and treatment in certain infections. The results of artificial abscess production in animals and man are fully described, together with microscopic findings. It is believed that inoculation of the sterilized pus has decided influence in cutting short certain infections, and that the general appearance and microscopic findings of the primary and secondary abscesses may be of value in making a prognosis in widely different pathologic conditions.

M. NICOLL, JR.

THERAPEUTICS.

FUCHS, A.: THE TREATMENT OF TUBERCULOUS CHILDREN WITH LARGE DOSES OF TUBERCULIN. (*Jahrb. für Kinderhk.*, November 1, 1910, p. 523.)

The method of treatment was that so highly recommended by Schlossmann, *i.e.*, immunization with progressively increasing doses of tuberculin. The initial dose was usually 1 c.c. of 1 to 10,000 tuberculin. The dose was gradually increased, in the absence of febrile reaction, until a maximum dose of 1 gm. tuberculin was injected. Most of the author's patients suffered from surgical tuberculosis. The immunization was accomplished in about six to eight weeks. It was considerably delayed by the presence of pulmonary complications.

This mode of treatment in the author's hands proved highly disappointing, as no permanent therapeutic effects could be demonstrated in any of the cases. In fact, in a few cases the tuberculous process continued to develop and spread to more distant parts, while the immunization was being carried out. S. FELDSTEIN.

BOOK REVIEWS.

CASE HISTORIES IN PEDIATRICS. A COLLECTION OF HISTORIES OF ACTUAL PATIENTS SELECTED TO ILLUSTRATE THE DIAGNOSIS, PROGNOSIS AND TREATMENT OF THE MOST IMPORTANT DISEASES OF INFANCY AND CHILDHOOD. By JOHN LOVETT MORSE, A.M., M.D., Assistant Professor of Pediatrics, Harvard Medical School; Associate Visiting Physician to the Infants' Hospital and at the Children's Hospital, Boston. Pp. 314. Boston: W. M. Leonard, 1911.

A book on Pediatrics appearing under Dr. Morse's name needs no recommendation on the score of excellence. This volume, however, merits discussion from a different point of view, that of the type of book. It consists of 100 actual cases of illness in childhood seen and recorded by Dr. Morse. In each instance the case history is detailed carefully, the physical examination noted, and a logical exposition follows of the factors entering into the diagnosis and of the methods of treatment. This has been accomplished with skill and thoroughness. The cases have been divided according to the type of disease into twelve sections, as diseases of newborn, diseases of gastroenteric tract, diseases of heart and pericardium, of liver, of blood, etc., with from 3 to 20 cases under each section. There is an excellent index. The style is pleasantly straightforward, simple and clear, and is distinctly that of a speaker. The cases are varied and typical. The reasoning is conclusive; the treatment is, naturally, up to date.

To every one, whether he is exclusively a pediatricist or not, this book should be useful and interesting. It is a well-recognized fact that the most effective teaching can be done at the bedside or in the clinical lecture, that it far surpasses the didactic lecture and ordinary text-book reading. Such a book as this of Dr. Morse's approaches as nearly as a book can the ideal condition. The reader can focus his attention on one group of real symptoms and real physical signs and follow the mind of a master as he in an orderly fashion weighs and considers their relative value in the matter of the diagnosis. Then, too, in the matter of treatment the author can introduce his own methods and make his work more personal than he can in the ordinary text-book form.

The field has by no means been exhausted by this book. Dr. Morse might well collect another 100 cases, or some other teacher might present another series of his own without crowding this first book, or lessening in any way its great value which all who examine it will readily appreciate.

TRAITÉ DES MALADIES DU NOURISSON. By DR. A. LESAGE, Physician of the Hospitals of Paris. Vol. I., 8vo. Pp. vi., 736, with 69 illustrations in the text. Masson & Company, Publishers, Paris, 1911.

This book is especially noteworthy for the amount of space devoted to the normal child and the matter of proper feeding. This occupies about half the book and is therefore much more thoroughly done than in the usual text-book. Many tables and charts lend additional attractiveness to the presentation of this important branch and make it well worthy of being followed by English text-books. The consideration of abnormal childhood is necessarily briefer than is usual to us, but is nevertheless well done and being in French compresses many ideas into small compass. The author's ideas vary considerably from American practice, as would be expected. It is interesting to note his use of milk throughout certain diarrheas and the suggestion made by him first in 1904 of injecting mother's serum in cases of summer diarrhea. For those who wish a complete pediatric library this book will be worth purchasing.

TRANSACTIONS OF THE CONGRESS OF AMERICAN PHYSICIANS AND SURGEONS. Eighth Triennial Session held at Washington, D. C., May 3 and 4, 1910. Published by the Congress, New Haven, Conn., 1910.

This volume is a remarkable symposium upon the subject of vaccinal immunity and therapy, and marks the latest word in this field. It would be impossible to do more than indicate the contents, which embrace the fields of otology, ophthalmology, laryngology, rhinology, pediatrics, general medicine, surgery, gynecology, dermatology, psychiatry, pathology and bacteriology. The writers are, as their membership in the Congress indicates, the authorities in their respective fields, and for the man who wishes to know what there is now known about vaccines will find here what he seeks.

ARCHIVES OF PEDIATRICS

APRIL, 1911.

ROYAL STORRS HAYNES, PH.B., M.D.,
EDITOR.

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

CONVALESCENT HOSPITALS FOR CHILDREN.

Going through the children's ward of a large hospital the visitor comes to a bed where a bright, intelligent little lad of six is lying with his head in a mastoid dressing and his bed covered with toys with which he is playing as well as he can lying flat on his back. He is a thin, pale little fellow, and the temperature chart at the foot of the bed shows a slight elevation. His attitude and his intelligence provoke curiosity, and the nurse says, in answer to the visitor's question about him, "Oh, Joe? Joe's had mastoid and it is nearly well; but there's something the matter with his heart and the doctor says he must be quiet. It is awfully hard to keep him that way, though, for he will get up and get out

of bed when I'm not looking, and when he does it makes his fever go up. I don't know who will look after him when he goes home. His mother works and he has to take care of himself pretty much, I guess. Dr. Smith says he can't get real well unless he is quiet, and to keep him quiet needs all one person's time."

This is a very common situation. A child with an acute illness is put to bed with appropriate treatment, and, being very sick, is glad to lie quiet and needs no restraining. But as soon as he gets a little better and feels well he will not stay quiet, and must be watched. And here the weakness of the hospital system becomes apparent. A large hospital is a specialized plant to take care of the very sick. Everybody is busily employed; there is too much to be done to look after patients who have partially recovered; and the beds are needed for sicker children. It costs more than is necessary for convalescents to utilize for their care trained nurses and hospital machinery when almost all they need is rest and watching. So, just as soon as it is no longer dangerous, the children are sent home, with the work of recovery only half done.

The children of the well-to-do can get care and attention of the most suitable kind. They can have fresh air, sunshine, good food and watchful supervision until they are quite well. But the children of the poor are their own guardians largely, and their parents, even with supplementary charitable aid, can seldom approximate the care which the child got in the hospital. And this happens with many other types of cases beside the heart case. Joe represents simply an actual incident pointing out the need of more convalescent hospitals, more so-called "rests."

The economic waste of expending the money to treat a child in a hospital at anywhere from one to two dollars a day, only to let the entire investment fail because of too short a stay under observation, should appeal to some of our citizens whose wealth is a burden and suggest that they establish institutions for completing a cure.

Take some country village, build an up-to-date, even if it be

a small, institution, endow it with enough money to provide for the proper care of these children, and good men can be found to take care of the medical end of it, so that scientific work can be done, and who knows what may not be discovered? Such a project is well worth any one's life work and any man's millions.

PYELITIS.

The report of the case of pyelitis and pyelocystitis cured by autogenous vaccines, reported by Dr. Fife on page 309, is an interesting one, and serves to draw the attention of the practitioner to this not infrequent class of cases. Of late years reports of such cases have been abundant, and their recognition is surely within the capabilities of everyone, whether or not he specializes in pediatrics. The histories are usually much like that of the case reported, though not always so severe. There are antecedent attacks of intestinal disturbance, followed by acute attacks of fever, vomiting, rigors and prostration, or even with fever alone. In fact, any case of fever in a child without definite signs must be freed from the suspicion of being a pyelitis by means of a urine examination before a different cause for the fever can be regarded as certain. And the absence of pus does not dispel the suspicion because a colibacteremia may exist alone.

The treatment is usually protracted. The fever may subside promptly, while the urinary signs may persist for along time. Relapses are almost the rule. In view of the occurrence of these relapses, even after a course of vaccine treatment, which seems to be the quickest way to clear the urine of bacteria, one must persist in it for some time after cultures are negative. In mild cases, too, considering the expense entailed in preparing an autogenous vaccine, the annoyance of giving injections to children, and the readiness with which the symptoms disappear and the urine is freed from pus by the older treatment of first acidifying the urine and then administering hexamethylenamine, it is questionable whether the older method is not, after all, the most satisfactory, and the vaccine treatment better used only in severe cases.

ORIGINAL COMMUNICATIONS.

DIARRHEA IN CHILDREN, WITH ESPECIAL REFERENCE TO DIVI-DIVI AS A DRUG, AND TO BANANA FLOUR AND PLANTAIN MEAL AS A FOOD.

BY A. E. VIPOND, M.D.,

Senior Physician, Outdoor Department, Children's Memorial Hospital, and for the Montreal Dispensary, and Physician to the Protestant Infants' Home.

For many years past I have not felt satisfied with our treatment for diarrhea in infants and in children. This applies both to the form of food given and to the treatment of this disease by drugs. In all our large cities the death rate from this disease is enormous, and I am sorry to say that our treatment has not improved during the past decade; in fact, the death rate from diarrhea is on the increase in many of our larger cities.

The question arises, Why do we have such an enormous number of deaths from this disease and such poor results with our present method of treatment? I have arrived at the conclusion that there are ways of diminishing our infant death rate and will mention the most important:—

(1) A young woman or girl should not be allowed to marry until she can show that she had had some instruction as to the care of infants.

(2) Women should be taught that it is absolutely necessary for them to nurse their infants and should not give up nursing for any trivial reason. Before deciding to wean their infants they should consult an intelligent physician, who can, in many cases, put them in the right path.

(3) Mothers should follow out the doctor's advice in regard to the feeding, etc., of their children. I am convinced that many of the mothers who attend my clinic do not follow my advice about feeding, medicine, etc. Some of them are too careless and others are too ignorant to grasp what I say. This applies particularly to the Jewish race, and one of the reasons is that, as a rule, the poor Jewish infant is a spoiled child, and if it cries for anything the father and mother are sure to give it what it wants.

(4) The child must be kept clean. The house must be clean and free from a foul atmosphere. It is all very well taking an infant out into the fresh air, but what beneficial results can be expected from the outing if the child is brought back into a foul atmosphere?

I think it would be well to have printed instructions given to the mothers telling about food, fresh air, cleanliness, etc.

Nearly all of the infants who die from diarrhea are hand-fed. Dr. G. F. Still has shown that 96 per cent. of those who die of infantile diarrhea at Great Ormond Street, London, have been hand-fed.

Sir Shirley Murphy's report for 1904 gives the following: 2,347 children under one year died of epidemic diarrhea in London, and 457 from one to five years, making a total of 2,847, so that out of this number only 43 patients were over five years of age.

The death rate from diarrhea in New York City presents startling figures. Of the 14,015 deaths under one year (report of 1903), 3,769 were from diarrhea, the majority taking place during July, August and September (Dr. Charles Herrman, New York, *ARCHIVES OF PEDIATRICS*, July, 1907).

I have mentioned purposely the largest city in the British Isles and in the United States. We now come to Montreal, our largest Canadian city. If New York's figures for diarrhea are startling Montreal's are appalling. The following figures have been gleaned from the able and full report of Dr. Louis Laberge for 1909, the chief medical officer for Montreal city.

There have been 14,678 births (here let me state at the outset that I do not believe for a moment that this represents the full number; many have not been reported), and the mortality shows 8,703 deaths. Thus we have only added to our Montreal population the difference between 14,678 and 8,703, which is 5,975. Diarrhea carried off 1,897 children, and the great majority under one year; and although we had a nice, cool summer, with very few hot days, we lost 99 children more in 1909 than we did in 1908. Under one year of age the Jewish percentage of deaths was enormous, being 44.18 per cent. of the whole. The Jews also have a percentage of 66 per cent. of deaths under five years as compared to the Christians' 34.78 per cent.

During the year 1909 we had a grand total of 1897 cases of death from diarrhea in the city of Montreal, and this does not include cases of infantile debility, which numbered 576. In other words, out of a total death list of 8,703 we had 2,472 deaths from diarrhea and infantile debility. Think of the slaughter of the innocents! If 2,500 children or adults had died of small-pox, cholera, etc., what a hue and cry we would have—but they only died

of diarrhea—and we seem to expect a certain number of deaths from this disease during our summer months. July, August and September contributed 996 deaths to this total; 451 children died of diarrhea during July—over 100 a week—and yet we take it quietly! Ten years ago we had 740 deaths from diarrhea. I admit that our population has increased considerably during the past ten years, but not to such an extent as to warrant such an increase in the number of cases of diarrhea.

This does not speak well for our present treatment of the disease. During the past ten years we have made great advances in surgery, pathology and bacteriology, but I cannot say the same for treatment.

Let us examine into the causes of summer diarrhea in children. I think they can be divided into primary and secondary causes.

The primary cause is artificial feeding. Many mothers do not want to nurse their infants. I have taken notes of 334 children one year of age and under, and I find that out of this number 175, or $53\frac{1}{2}$ per cent., were nursed, and 152, or $46\frac{1}{2}$ per cent., were not nursed, or only for a short time. I have notes of 40 infants in private practice who suffered from diarrhea, and I find that only 9 of these were nursed, and 31 were not nursed. Among the hospital patients 38, or 47 per cent., were nursed, and 43, or 53 per cent., were not nursed. Can we wonder that diarrhea is prevalent during our summer months when so many of these poor children are cut off from nature's food? Why are these little ones not nursed? Among the rich many of the mothers do not wish to nurse their babies—it interferes with their social engagements—and many of the same class imagine that their strength is not sufficient to stand the strain. Among the poor the excuses are many and various.

The secondary causes are many. I will not attempt to classify them, but I might mention dirty bottles and nipples, but especially the time-honored "comforter." This frequently falls out of the baby's mouth on to a dirty floor, and the mother takes it up and puts it into the infant's mouth—she may or may not wipe it on her dirty handkerchief or skirt. Another cause is dirty surroundings with a foul atmosphere. No infant's stomach can stand this. Illy-ventilated rooms play their part. The poor Jewish children are particularly prone to develop diarrhea.

We now come to temperature. We all know how a hot, wet,

summer particularly tends to favor diarrhea. Thunder storms may produce diarrhea, especially a loud clap of thunder; it seems to upset the infant's digestion. Several of my patients were getting better, but the morning after a bad thunder storm another attack of diarrhea came on. Cold tends to produce diarrhea by contracting the superficial vessels, producing engorgement of the internal vessels. A baby's legs and abdomen should be kept warm.

Food plays an important part in producing diarrhea, especially contaminated milk. The milk may be contaminated before reaching the child's digestive tract, or may become contaminated after entering the bowel. I may mention that children with rickets are especially prone to develop diarrhea. Also unripe fruit and over-feeding play a part.

There are several microorganisms producing summer diarrhea of infants, but the bacillus dysenteriae of Flexner seems to play the principal part in many cases. This would seem to be practically identical with Shiga's bacillus of dysentery. However, the intestinal tract is the storehouse of numerous other microorganisms, many of which, under favorable conditions, would act as the exciting cause in summer diarrhea. Dr. H. de R. Morgan, M.A., Oxon., M.R.C.S., Eng., has isolated a bacillus in 28 out of 58 cases of summer diarrhea. It is motile, broad, about the size of the bacillus of enteritidis of Gærtner, and resembles the hog cholera bacillus of McFadyean, from which it is differentiated by other tests (*British Medical Journal*, April 21, 1906).

Up to the present time no serum has proved of any value in the treatment of diarrhea, and I think we can hardly look forward to good results along this line.

I found it difficult to classify the different types of diarrhea. Pathologically it is an easy matter, but not so clinically, as many of the cases which begin with mild symptoms later on merge into a severe form of congestive diarrhea or dysentery. I have divided the cases into several groups for my own convenience:—

(1) *Simple Irritative Diarrhea*, where the bowels move five or six times in the twenty-four hours, or even eight to ten times, with or without vomiting. The history generally given is a sudden onset, with vomiting and diarrhea; the temperature was normal, or raised to about 100°F.; the motions were profuse, watery, and, as a rule, green and foul. To this group belonged 110 of my cases.

(2) *Acute Congestive Diarrhea*.—To this class belong cases with a temperature of 100° - 103° F. or over; pulse rapid, and the bowels moving ten to twenty times a day. The motions are much the same as in the simple irritative diarrhea, but the patient is exhausted and tenesmus is a common symptom without any other signs of dysentery. To this class belong about 30 cases.

(3) *Dysentery*.—Here I had 24 cases to deal with. This is certainly a large percentage and shows that the epidemic, if I may call it such, was not a mild one. I need not dwell on the symptoms of dysentery.

(4) *Cholera Infantum*.—To this fatal group belonged 3 or 4 cases, and fully 50 per cent. were lost. We all recognize the frightful picture of cholera infantum and what little chance the child has of recovery.

(5) *Acute Toxic Diarrhea*.—I have given it this name, as I cannot think of a better one. These cases form a distinct class by themselves. I have met with 3 such during the summer of 1910. They were rapidly fatal, and hyperpyrexia developed in 2 out of the 3 cases. In Case I. the symptoms came on suddenly during the early morning with vomiting and diarrhea. The infant was soon collapsed. I may mention that this child was a healthy, stout, breast-fed baby of about six months, living in a healthy country district about thirty-eight miles from the city. I saw the child at about 9:30 A.M., and it had recovered somewhat. However, it soon developed hyperpyrexia, with great thirst; the temperature went up to 107° F., and the little one lay stunned. The extremities and external surfaces of the body were cold and the pulse nearly imperceptible. Death took place about 5:30 P.M. on the same day. The child did not lose weight to any extent, and the bowels only moved four or five times. The eyes were not sunken.

Contrast this picture with cholera infantum. This child died from hyperpyrexia and the myocardium soon gave out. In a case of diarrhea the temperature should always be taken by the rectum, as the external low temperature may mean an internal hyperpyrexia.

CASE II. was much the same. An infant of about eight months presented practically the same symptoms, with a temperature of 106.8° F., cold extremities and nystagmus. It was rapidly fatal.

The third case had a temperature of 107° F.; the bowels moved four to five times a day; vomiting was persistent; the body sur-

face was cold; there was no emaciation. The child was breast-fed and about one year old. Death took place in a few hours' time.

(6) *Chronic Diarrhea*.—I had 15 cases in this group, and most of them recovered. The history received from most of them was that the patient had diarrhea off and on for two to six months, well one day and poorly the next, the bowels moving from four to eight times a day. There is a gradual loss of weight, the child becomes pale, and vomiting may take place at times. It is, as a rule, non-febrile. Simple ulceration or tuberculosis may be suspected. It may take on the type of the lenteric diarrhea.

I notice a few interesting points among my notes: Twenty-five of the children who had diarrhea were nursed exclusively, but, as a rule, the diarrhea was not severe and most of the little patients looked comfortable. However, one of the toxic cases belonged to the nursing group; 14 of the total number of cases developed cough, and 3 or 4 were complicated by pneumonia; 9 of the number developed stomatitis, mostly of the aphthous or ulcerative type.

I have treated 286 cases with tincture of divi-divi, the majority of the cases occurring during the months of June, July, August and September of the present year. Out of the 286 cases, 190 recovered, 11 were not improved, and 75 did not return to report results. (These were treated at my clinic, and most of the 75 were mild cases and surely got better; however, I am not counting them among the number of recoveries.) Ten of the number died, but two of them were complicated by pneumonia. This leaves 8 to be accounted for. One of this number came to my outdoor clinic in connection with the Children's Memorial Hospital suffering from the toxic form of diarrhea, with hyperpyrexia and a temperature of 107°F.; she died a few hours after I had seen her. Another case was one of cholera infantum; it had been ill for twelve days when first seen by me. Another was a case of toxic diarrhea, with a temperature of 104½°F., and a pulse of 150; death took place rapidly. I was called to see the sixth case, a child of seven weeks, which weighed 5 pounds at birth; it had lost about 1 pound since. The bowels moved eight to ten times a day, with vomiting; it only lived a short time. In the seventh fatal case the bowels moved from ten to twelve times a day; pulse, 150. It was somewhat collapsed, with sunken fontanel. Next morning it was somewhat better, but the little heart gave out in a short time. The eighth case had been under my care

for some weeks and had recovered under tincture of divi-divi, but the mother brought her to some country place, where, along with many other children, she developed diarrhea. The mother brought her home, and to see me, but she was collapsed and had no chance of recovery. She was seven months of age. The ninth case was a child of four months, but the mother was a careless woman and neglected it and did not return for weeks; the infant died from marasmus. The last fatal result was in an infant of seven months. It was a severe type of diarrhea, but I did not anticipate a fatal ending. The child died suddenly.

I have gone into the histories of the 10 fatal cases pretty fully, and I feel that in 9 of them I could not have expected results from any kind of treatment.

Of the 190 cases which recovered many of them were severe cases, some nearly ending fatally.

In regard to the age of the patients who suffered from diarrhea I have classified them as follows:

One month and under.....	4 cases
Two months.....	10 cases
Three months.....	9 cases
Four months.....	13 cases
Four to six months.....	23 cases
Six to eight months.....	28 cases
Eight to twelve months.....	59 cases
Twelve to fifteen months.....	25 cases
Fifteen months to two years.....	71 cases
Two to five years.....	25 cases
Over five years.....	9 cases
Fourteen days.....	1 case

It will be noticed that between birth and four months the cases were not numerous and the reason of this is that many mothers nurse their little ones up to two to four months, then put them on some artificial mixture. From four months up to eight months, or to twelve months, there is a progressive increase, especially between eight and twelve months; as this is the period when the majority of infants are weaned and put upon an improper food. From fifteen months to two years of age I had 71 cases, the largest number taking place at this period of life. Among the poorer classes this is the age where the child is allowed to shift

for itself and can eat what and when it likes. Especially during the summer months he is prone to devour unripe fruit and almost anything he can lay his hands on; hence the large number of cases at this time of life. From the age of two to five years I had only 25 cases. This does not surprise me, as so many of the infants have been killed off before reaching this age that there are not so many children left. Also by this time the child has a hold upon life and can resist better the action of the numerous microorganisms which inhabit his intestinal tract. Over five years of age I had only 9 patients who suffered from diarrhea and 3 to 4 of these were adults.

TREATMENT OF SUMMER DIARRHEA IN CHILDREN, WITH ESPECIAL
REFERENCE TO BANANA FLOUR AND PLANTAIN MEAL AS A
FOOD, AND TO DIVI-DIVI AS A MEDICINE.

For many years past I have felt that our treatment of diarrhea in children has not been a success. During my travels in the West Indies I determined to try to find some other astringent, or combination of astringents, not already used by the medical profession for diarrhea. This applies to food and medicine. In banana flour and plantain meal we have a nourishing food, easily digested, and of an astringent quality. An article written by me in July, and published in the *Montreal Medical Journal*, September, 1910, page 590, goes into its various qualities pretty fully. As I stated in that article I do not regard it as an ideal food, but it will tide over a critical period, will keep up the patient's nourishment and strength and will tend to arrest the diarrhea. The chemical analysis gives the following:

Moisture	10.2 per cent.
Ash	4.95 per cent.
Protein	3.06 per cent.
Fat .....	.52 per cent.
Fibre .....	.55 per cent.
Dextrose	7.14 per cent.
Tannin	1.29 per cent.
Other carbohydrates.....	72.47 per cent.

The ash contains phosphoric acid 10.52 per cent., and potash 37.24 per cent. Its astringent qualities are due to the amount of tannin, namely, 1.29 per cent. The fat percentage is small, but

it has 3.06 per cent. of protein and a good amount of sugar, namely, 7.14 per cent., with a large percentage of starch, 72.47 per cent.

The banana flour and plantain meal are prepared in much the same way as one would prepare corn starch. Three teaspoonfuls are put into a small dish, rubbed up with a small quantity of sterilized water, then about 10 ounces of boiling water is poured on to it, stirring vigorously all the time. Boil for ten minutes and add a little sugar and a pinch of salt. If too thick you may add a little more boiling water. This may be given to children under two years. For older children it may be made into a pap or porridge, or into banana cakes, etc. The taste is somewhat astringent; this applies to banana flour. The taste of plantain meal is pleasant. Some infants take the banana gruel greedily, others do not seem to appreciate it, but the hungry child will take almost anything. A few of them will not take it, and a very few will not retain it.

I have notes of 43 cases of diarrhea treated with divi-divi as a drug and banana flour as a food. The rest of the patients were treated with divi-divi alone. After taking the banana flour or plantain meal the motions soon change their color and become brown and lose the bad odor so characteristic of many of these cases. The first result noted is not so much a diminution in frequency of the motions, but they get to be more solid and lose their watery character; sometimes they become quite hard. In a short time the frequency lessens, especially if the banana flour is used divi-divi. Some of my patients have gone on with the banana flour for weeks at a time, and then when they returned to any other food the diarrhea started again, ceasing when they went back to the banana flour. I may mention here a case which is under my care to-day.

A miserable child of one year of age who has had diarrhea for the past four months. Almost every astringent has been tried to arrest the trouble. The child is practically a skeleton with the bowels moving four or five times a day and vomiting at times. I saw her for the first time on Wednesday, October 12, 1910; put her on banana flour, tincture of divi-divi and strychnin. On my second visit on October 15th, I found that the bowels had moved only once on the 13th, once on the 14th and once on the 15th. The odor, which was foul, has disappeared, the motions are thick and the child is much better. I do not know of any other form of treatment which would have produced the same results.

The question will be asked: What is tincture of divi-divi? The following description is taken from "Economic Plants," compiled by William Fawcett, B.Sc., F.L.S., Director of Public Gardens and Plantations, Jamaica, 1881.

"*Cesalpinia coriaria*, wild. (Divi-divi.) Native of West Indies, central and tropical America. A small crooked tree; leaves twice pennate; flowers fragrant, white; pod flat, incurved. Rich in tannin."

The following report is by Mr. Leo Ryan, Montreal, proprietor of the Wingate Chemical Company.

"Fruit or pod flat, incurved, outer epidermis generally smooth, of a dark brown color, containing coloring matter characteristic of the *cesalpinia* family. The pods are rich in tannin, containing 60-75 per cent., which is mixed with resinous and coloring matter; about six or eight seeds to the pod. Seeds are very hard and contain an oleoresin which induces fermentation. Divi-divi, or libidibi, is largely used in tanning. It is a powerful astringent and the tincture prepared contains about 50 per cent. of tannin. The tincture is prepared by percolation with a special menstruum and allowed to stand for five or six days before it is filtered. It is of a rich, dark, red color, tastes bitter and astringent, with a slight pungent odor. I may add that the taste is not very disagreeable."

During the past few years the treatment of diarrhea has made little progress. I have lost considerable confidence in what appears to be the sheet-anchor of diarrhea, bismuth. It acts well in some cases, but it so absolutely fails in others. I have tried most of the popular drugs for the trouble but with poor success. Others must have had my experience because, as I said before, 1,896 children died from diarrhea in Montreal in 1909. The same applies to London, New York, and other large cities.

I have used practically the same treatment for all cases of diarrhea and for all ages. Out of the total number treated, namely, 286 cases, I have only full reports of 217. Out of the 193 cases, 7 died from the diarrhea, a mortality of 4 per cent., surely not a high death rate considering the number of severe cases noted.

As one can see, the tincture of divi-divi contains 50 per cent. of tannin as well as oleoresins. I do not think that the astringent action of divi-divi is altogether due to the action of tannin, but also to the oleoresins. I do not know what they are and no one else appears to know.

I began by giving the little patients 20 drops of the tincture in

a little water every four hours; later on I increased the dose to $\frac{1}{2}$ dram every two hours, and now I give 1 dram every two hours until the diarrhea is arrested. It seems to be a large dose when we consider that the tincture contains 50 per cent. of tannin, but I give this to infants over two months of age and I have never seen any bad results. The four little infants four months and under were given the large doses and all recovered, the youngest being fourteen days.

I have the following method of giving the tincture of divi-divi. Mix 1 dram of medicine with 2 drams of boiled water and give it slowly a few drops at a time with a sip of boiled water between to keep the astringent taste off the palate. If this is not done the child may vomit and I would lay stress on following out directions to the letter. Before giving the divi-divi I think it advisable to give a dose of castor-oil.

Many of the cases of diarrhea were complicated with vomiting. If the vomiting persists it is well to wash out the stomach and then begin with the divi-divi. However, in many cases where there was vomiting the divi-divi seemed to arrest it.

I would not hesitate to give an infant of one month 1 dram of the tincture of divi-divi every two hours. The drug may produce an immediate effect. In many cases the diarrhea was arrested after taking one dose; in other instances it took several to do good, while in some it had to be kept up for days. As a rule it acts quickly, and the earlier it is given the better the result, but I have had excellent results in chronic cases. In 11 cases it seemed to have no effect, even appearing to increase the trouble in 2 or 3 cases, so that I do not look on it as an absolutely certain cure. We have our failures with the tincture of divi-divi and must expect them occasionally. It has acted well in dysenteric cases and can be here given by the rectum as well as by the mouth. One case especially impressed itself upon my memory—an emaciated child of about five months was brought to see me, the bowels were moving about fourteen times a day and it was collapsed. I could give no medicine by the mouth as the child suffered from pyloric spasm. As a forlorn hope I told the mother to inject the tincture of divi-divi, diluted with hot water, into the child's rectum. She did so and the diarrhea was arrested entirely by next morning. The child vomited for several months on account of the pyloric spasm but ultimately recovered completely.

I shall now give short reports of about 30 cases treated by this method.

1. Baby W., aged three months, fed artificially. Diarrhea has lasted three weeks. August 21, 1910, bowels moved nine times a day; motions are green, curdy, and like water. The child is skin and bone and weighs about five pounds; skin inelastic; depressed fontanel; purpuric spots on the body. Altogether it seemed a hopeless case. Treated by tincture of divi-divi, 1 dram every two hours, and banana flour as a food.

August 23d: Bowels moved three times during the night, twice during the day. Much improved; taking food readily; motions more solid. August 25th: Much better.

September 5th: Putting on flesh; bowels move twice a day. Losing wrinkled appearance; skin regaining tone. September 9th: Stouter; no diarrhea; motions hard. Could hardly recognize the former skeleton.

2. Baby M., aged ten months, fed artificially. August 25, 1910: Bowels moving five to six times a day; motions yellow and foul. Treated tincture of divi-divi. August 27th: Bowels moved once.

3. Baby O'R., aged two years. August 29, 1910: Diarrhea and vomiting for six weeks; bowels moved ten times a day; motions foul, green, and small in amount. Temperature 99.4° F. August 30th: Bowels moved once since taking the banana flour and tincture of divi-divi.

4. Baby F., aged fourteen days. Since child was five days old it has had diarrhea, bowels moving fourteen times a day. September 5, 1910: Vomits everything it takes; motions green, small in amount and foul. September 7th: Quite well after taking two doses of tincture of divi-divi. September 30th: A fine stout child.

5. Baby B., aged one year; dysentery one week. October 2, 1910: Bowels moved ten times, blood, mucus and tenesmus. Given tincture of divi-divi. October 4th: No improvement, bowels moved ten times. October 6th: Bowels moved four times. October 7th: Bowels only moved once. Child better.

6. Baby D., aged four months. August 2, 1910: Diarrhea and vomiting. One month's artificial feeding; a living skeleton; petechiæ over body; skin inelastic. August 4th: Child much better, no vomiting, bowels moved only once a day; taking tincture of divi-divi every two hours.

7. Baby N., aged two months. July 6, 1910: Nursed at night time as the mother works out during the day. Bowels moving every few minutes; motions yellow, like water, and, as the mother expresses it, everything goes through her. Semi-collapsed with a temperature of 100° F. July 8th: Bowels moved three times during the twenty-four hours after taking tincture of divi-divi. July 11th: Quite well.

8. Baby B., aged two years. Dysentery. June 26, 1910: Since last night bowels moved forty to fifty times, with blood, tenesmus and mucus. Temperature 100° F. June 28th: Bowels moved seven times after taking the tincture; temperature 98.4° F. June 30th: Bowels moved five times. July 4th: Child feels well; bowels moved four times.

9. Baby B., aged eleven months. July 9, 1910: Bowels moved eighteen times; child very weak. Motions foul, large in amount and green. Gave tincture of divi-divi. July 10th: Bowels moved five times. July 11th: Child quite well.

10. Baby L., aged six months. July 11, 1910: Bowels moving twenty times a day; motions foul, yellow, like water. Lasted for two weeks. July 12th: No movement since given tincture of divi-divi.

11. Baby S., aged one month. Not nursing. July 16, 1910: Severe diarrhea for three weeks, ten to fifteen stools a day; motions small, foul; child very weak. Given tincture of divi-divi. July 17th: Bowels moved five times; July 18th, four times; July 19th, once; July 20th, once.

12. Baby W., aged four years. June 13, 1910: Bowels moved five times a day; motions green with mucus; tincture of divi-divi. July 2d: Better after the first dose.

13. Baby Y., aged three-and-a-half years. February 21, 1910: Has had diarrhea for from five to six weeks, the bowels moving twenty times a day; motions like water, small and foul. February 22d: Bowels moved three times; February 23d, twice and on the 24th once, with a normal motion and the child quite well.

14. Baby P., aged twenty-two months. July 26, 1910: Has had diarrhea for twenty-two days, bowels moving four times a day; motions large in amount, brown and foul. Given tincture of divi-divi. July 29th, motions once a day.

15. Baby L., aged seven months. Fed artificially. Bowels moving every few minutes. Child collapsed and almost dead;

temperature $104.2\frac{2}{5}^{\circ}$ F., pulse 150. Child died in a short time.

16. Babies L. and B., twins, aged one year. August 30, 1910: Both of their bowels are moving nine times a day; motions large, green and like water. September 1st: Both are better; bowels only moved once. They were both given banana flour and tincture of divi-divi.

17. Baby D., aged eight months. This child had diarrhea for two months off and on. August 2, 1910: Bowels move ten times a day; motions foul, green, and like water, with tenesmus. Banana flour and tincture of divi-divi given. August 4th: Bowels moved four times; August 7th, three times; August 8th, did not move once. August 16th: Diarrhea began again short time after a severe thunder storm. Employed the same treatment with the same results.

18. Baby R., aged four years. Case of chronic diarrhea, bowels moving several times a day. No improvement took place with bismuth but she got quite well in a few days' time with tincture of divi-divi.

19. Baby H., aged eight months. Fed artificially. August 5th: This child has had diarrhea off and on for two months. A weak, emaciated child. Stools four times a day, yellow, and like water. Treatment with divi-divi and banana flour. August 8th: Two or three stools. August 15th: Quite well; motions thick.

20. Baby B., aged two years. August 4th: This child developed diarrhea with vomiting at 2:30 A.M., during a severe thunder storm; bowels moved four to five times; motions large in amount, like water and foul. Temperature 102.4° F. August 5th: Treatment with divi-divi. August 6th: Quite well, bowels moved once.

21. Baby G., aged nineteen months. August 2d: Severe type of diarrhea; bowels moved sixteen times a day; motions large in amount, foul, yellow and like water. Treatment with divi-divi with cure in three days.

22. Baby W., aged eighteen months. Case of chronic diarrhea persisting for six months. Bowels moved every half hour; stops for a day and then recurs again; worse at night. After treatment motions lessened to five times a day, then four, then two to three. March 2d: Child quite well.

23. Baby T., aged eight months. July 22, 1910: Sick for two days with diarrhea. Eyes sunken, collapsed, vomiting, bowels

moving seven to eight times daily; motions foul. July 25th: Motions five to six times; July 26: Only twice.

24. Baby F., aged eight months. Severe case of cholera infantum. Diarrhea began July 2, 1910, with vomiting; bowels moved twenty times in twenty-four hours; motions large, foul, yellow, like water. Temperature 104.4° F., pulse nearly imperceptible, eyes sunken. The child is restless and collapsed, moaning and throwing itself about. Tincture of divi-divi given. July 23d: better, only two motions; July 24th: better; July 28th: quite well.

25. Baby E. P., aged seventeen months. August 23d: Bowels moving ten to twelve times a day; motions green, and like water. Child very weak. August 24th: Quite well, bowels only moved once since first dose of divi-divi.

26, 27 and 28. Three cases in adults, all chronic in character. One took place in a woman of about fifty, who suffered from diarrhea for months; a case of Graves disease. Tincture of divi-divi arrested the diarrhea. The second case was in a woman with hemiplegia, aged about fifty-two years. She had diarrhea for one month. Opium and bismuth did not help much; bowels moved six to eight times a day. She was well after taking two doses of tincture of divi-divi. The third case was in a man of about forty-six years of age. He had diarrhea for months and the trouble was diagnosed as intestinal tuberculosis. I found out that he had used many astringents without results. I ordered the tincture of divi-divi and he was quite well in a short time.

I take these reported cases from my notes on this disease, and among the number one can readily see that there have been many mild and many severe cases treated. Several of the recoveries have been remarkable and I do not think that any other form of treatment would have produced the same results.

In the past I have been starving my little patients on barley water, rice water, egg albumen, etc., and the result is that the majority of fatal cases die from starvation and lowered blood pressure. The banana flour and plantain meal make up for the loss and at the same time they are nourishing. I do not claim that the food will fatten the infants, but most of them do not lose weight while taking it.

Now how long shall we keep the child on this flour? Just as long as the diarrhea persists. As to the after treatment, one must not be in a hurry to return to the ordinary diet. I generally

adopt the following plan when the diarrhea is arrested: add to the banana food half a teaspoonful of condensed milk at each feeding, and if this agrees the condensed milk may be gradually increased. This will get the little one into a pretty good condition and a little later on some form of modified milk suitable to the age of the child may be ordered.

There are a few other points in regard to the treatment. I think that small doses of strychnin help and I have used it in many of the cases reported. Another point is this—the child must be kept quiet and must not be tossed about and jumped in the arms of the nurse or mother. The little one must be kept warm; the legs must be wrapped in warm stockings reaching to the hips and a flannel binder put upon the abdomen. A chilled surface may readily defeat the object of our treatment.

In closing I must sound a note of warning. Do not look for a cure in every case, as cases may be met with where no treatment will avail, and in some others, even in mild cases, the divi-divi will have no effect. But these cases are few. The divi-divi may produce vomiting. If it is vomited for the first two or three times it is as a rule retained later on.

I must tender my thanks to Dr. Duncan Anderson, my colleague at the Protestant Infants' Home, and the Outdoor Department of the Children's Memorial Hospital, who ably assisted me with the notes of these cases. He has given the divi-divi a good trial, both at the Protestant infants' Home and in his private practice, with good results.

My thanks are also due to Dr. Fred Douglas, who has also assisted me with the notes of these cases at my clinic at the Montreal Dispensary, and also to Mr. Leo Ryan, who made the tincture at my request.

THERAPEUTIC USE OF ASCITIC FLUID.—T. Leary and R. W. Hastings (*Boston Medical and Surgical Journal*, August 18, 1910). Ascitic fluid, derived from cases of mechanical obstruction of the abdominal venous circulation, is recommended by the authors in the treatment of infantile debility. They consider it to be a valuable human saline, more effective than artificial salt solution or diluted sea water. Ascitic fluid so obtained contains no toxins, this having been proved by experiments on animals. Twenty-two cases of its successful use are reported.—*Prescriber*.

THE VALUE OF PROPHYLAXIS IN THE EARLY LIFE OF THE EXCEPTIONAL CHILD.*

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The value of prophylaxis in the early life of the exceptional child cannot be overestimated. The exceptional child is almost always physically pathologic; the lesions ranging from those which produce slight disturbances of psychological processes to the profound injuries of the cerebrospinal nervous system observed in idiots. The subject of the prophylaxis of this state is so vast that it is only possible to touch upon it in outline in this paper in the short time allotted. Any severe acute disease and most chronic diseases may be factors in its causation; only those, however, which bear a distinct relationship will be considered.

Prophylactic measures must be instituted *before the birth* of the child. Among the most important evils to be combated at this time need only be mentioned—syphilis, alcoholism, neuropathic states, tuberculosis, narcotism, insanity and epilepsy in the parents.

The correct treatment of the first mentioned condition (syphilis) is attended by particularly brilliant results, as has often been demonstrated by a first and third child, who are perfectly normal—the mother having taken treatment during these pregnancies; whereas the second child is exceptional, mentally and physically—the mother having neglected treatment during pregnancy. And no treatment, however thorough, after birth can entirely undo the harm of such neglect.

Unfortunately not all of these states are amenable to medical treatment. These must be met from a sociological standpoint, and marriage, or at least child-bearing, by the unfit, should be prevented.

During the act of birth much may be done in the way of prophylaxis. Prolonged and instrumental labor are serious etiological factors in the production of this class. The remedies are at hand and special skill should be sought early, to minimize the in-

* Reprinted from "Proceedings" of the National Association for the Study and Education of Exceptional Children, April, 1910. Copyrighted, 1910, by N. A. S. E. E. C.

juries from this source. The attention of physicians and midwives should be called to this danger.

After birth attention must be directed in three particular directions:

1. Correction of conditions producing chronic toxemia, whether due to disease processes, poor hygiene or faulty diet.
2. Correction of defects of special sense, sight, hearing, speech.
3. Correction of environmental faults, such as climate, locality, guardianship.

During the first year, feeding and general hygiene are of prime importance. For at this time may be laid the foundation of future trouble. Breast-feeding should be insisted upon, and in a very large percentage of cases can be successfully performed. The difference between the breast-fed and the artificially-fed child, no matter how satisfactorily the latter is carried out, is striking—not so much in the matter of general nutrition, for here the latter often has the advantage, but in the general tone of the nervous system. The breast-fed child, as a rule, is quiet, calm, happy and sleeps well, while the other is apt to be more restless, more irritable, and decidedly less stable.

At this time excitement, in the form of play, noise, confusion and irregularity in the daily routine are pronounced factors. In the second year of life and later toxemia are uppermost. It is now that the child, being of necessity artificially-fed, is put upon large quantities of milk, which, in a certain number of children, cause symptoms of anemia, irritability and general depression. Eggs in excess and sometimes in minimum quantity produce a similar condition. Less frequently the defect is in excessive feeding of sugar, sweets, or meat; or the fault may be excessive and too frequent feeding of proper food or insufficient feeding. The diet at this time should be chiefly cereals, vegetables, and fruits. After the third year coffee, tea, alcohol and drugs are causes of trouble which require attention.

It is now that defects of special sense begin to manifest themselves. First in importance is the sight; second, hearing; third, speech. Early recognition and appropriate treatment, whenever possible, will save months and years of future general abnormality. Here may be considered such conditions as adenoids, and hypertrophied tonsils, the removal of which is often attended by splendid results. But too much stress has been put upon these

particular conditions, especially when considering the exceptional child; for it is in this group that most frequently improper hygiene is the cause of adenoids and large tonsils—the lymphoid enlargement being the result, not the cause.

Dental caries is an important cause of toxemia in early life which may be easily removed.

Intestinal parasites should always be excluded in the consideration of this state. Numerous unusual symptoms may be due to this cause; prominent among which are general irritability, mental and physical hebetude, and anemia.

Masturbation in the very young child is nearly always due to peripheral irritation, the removal of which relieves the condition. Unrelieved the condition becomes a stubborn habit, difficult or impossible of cure. Although this is a factor to be considered, its influence is vastly exaggerated.

In the early age, too, of importance is the *environment*. Nervous, irritable adults, caring for a child, soon produce a marked effect upon it, depriving it of the rest which as much as sleep it requires at this time. *The tendency to drive* a normal child in order to demonstrate to admiring friends its high order of intelligence is a most pernicious practice.

Locality as a factor in infant life has not received the attention it deserves. A child may, for example, be subject to asthmatic attacks in one place, but yet be entirely free of them in a place not more than twenty miles away. Or again the influence of a quiet, restful country side for the well-being of a child as compared with the noisy city, is among the common observations upon this point.

Climate, too, is of importance. Some organisms flourish best at low altitudes, some at higher, while the salt air zone may be best for others. The fact that many people living at high altitudes, as in Colorado, must descend to lower levels, every few years, to overcome their nervousness; or, as in tropical countries, individuals from the temperate zone cannot exist unless they absent themselves at intervals, serve to illustrate, in a broad way, the idea here suggested. In other words, every organism has certain environmental and climatic requirements in which physically and mentally it is at its maximum. This is especially true of young children, and it is to be hoped that the future will see more use made of this knowledge.

A series of conditions to be considered in connection with the

prophylaxis of the exceptional child which can only be mentioned briefly are:—

(1) *Cretinism*, which when recognized early, *i.e.*, within the first year or two of life, makes it possible, by the constant administration of thyroid extract in adequate doses, to almost normalize children who otherwise remain imbecile.

Personal experience leads me to the belief that many older children who are subnormal mentally, and physically obese, whose respiratory excursions are limited, belong to this class and may be much benefited by the administration of thyroid, although, owing to the lapse of time without this glandular extract, they may never reach the degree of improvement that would have been possible had the condition been recognized earlier.

(2) *Achondroplasia*—a condition characterized by imperfect epiphyseal growth—is, in the majority of cases, accompanied by a mental retardation. A method for overcoming this state is at present unknown; but a recognition early might prevent mistakes in training.

(3) *Infantilism*—here the characteristics of the child are maintained through youth. Some of these cases are benefited by the use of pancreatic extract; others fail to respond.

(4) *Albinism* is a distinct cause of the condition under discussion, owing to the handicap of not being able to use the eyes well in bright light.

(5) *Malformations* of all kinds need only to be mentioned. The remedy must always be conditioned by the particular deformity.

(6) *Hyperthyroidism* is a term used to designate the symptom-complex, produced by an excessive secretion of the thyroid gland—hyperexcitability is the prominent feature. It is not very uncommon among young children, especially girls, and its early recognition permits of much improvement through rest and appropriate medication.

(7) *Enuresis*, habit spasm or tics, and chorea should be given proper treatment.

(8) *Too rapid growth* is a condition which, unless carefully handled, leads to a state which is pitiable. Individuals large in bulk but small in capacity may be helped by making it plain to them that their infirmity is transient—that no efforts should be made until growth is complete. Thus they are saved from self-consciousness, melancholy, and actual backwardness. The period

of life during which this condition exists may extend to beyond the majority. Boys are far more frequently sufferers from this cause than girls.

(9) A condition which, if noticed at all, has not been emphasized is one of general relaxation, for which the name *asthenia universalis* has recently been advanced.

Defects of the ocular muscles, spinal curvatures, ruptures, movable viscera, flat feet, are among the prominent symptoms of this disease. The cause is not known; it is sometimes present at birth. It may exist without symptoms. Usually, however, there is a disinclination for effort; the individual tires easily; the mental state may be distinctly atypical. It lends itself to treatment through proper hygiene and apparatus such as proper shoes, or plates, proper glasses, abdominal binders, the latter of which by changing the intraabdominal pressure favorably influence the splanchnic circulatory area, thereby producing the surprisingly good results often obtained by this apparently trivial procedure. *Disturbances of the nervous system*, especially when psychical, such as night terrors, or fixed ideas, prove readily amenable to appropriate treatment.

The psychology of early childhood is ordinarily not very obscure. The processes are usually of the simplest and the explanation ever at hand. Thus night terrors due to dreams of jumping frogs, after existing for weeks, were cured in one night by removing the child from his room, upon the walls of which was a frieze containing small human figures in attitudes which, in half light, could easily be mistaken for jumping frogs, to a room with plain walls. Take the example of another child who always spoke of "a man in dere," who never again made such a reference after the ulster hanging over a pair of overshoes and surmounted by a hat were taken down for him, to show him there was no man, although the idea had existed for months.

The researches of Professor Rotch, of Harvard, and Professor Pryor, of the University of Kentucky, in regard to the anatomic as compared with the chronologic age of the child, or, as they have been pleased to term it, the *anatomic index*, should prove of greatest value in the prophylaxis of the exceptional child, and in the prognosis of this condition.

The method of obtaining the anatomic index is to take an X-ray picture of the wrist, which shows by the order of the appearance and the number of the carpal bones, and the epiphyses of the

radius and ulna, the anatomic age. Rotch has found among feeble-minded children that they may be of the same height and weight as normal children of their years and yet their anatomic index corresponded more nearly to their low grade of mental capacity than to their general physical development.

Unfortunately, there is a large percentage of children of the exceptional class for whom prophylaxis or treatment in the present state of our knowledge is powerless; but for the others much can be done, and it is necessary to look to the sociologist, physician, psychologist, and pedagogue, to solve this problem by proper coöperation.

ETIOLOGY AND SYMPTOMATOLOGY OF INFANTILE SCURVY.—This question is considered by J. P. Crozer Griffith (*New York Medical Journal*, June 25, 1910), who says that there is in addition to dietetic faults an individual predisposition, active in the production of scurvy; otherwise, we should find much more of the disease than we do. In some families the disease comes on about a certain age. The most striking symptom is pain, often of sudden onset. The mistaken diagnosis of trauma may be made. Pseudoparalysis is a natural consequence of pain on movement. Involvement of the gums is present in the majority of cases. Swelling of the limbs is another symptom seen regularly in severe cases. Hemorrhage, such as occurs beneath the periosteum and in the gums, is also seen in other parts of the body, and is most characteristic. It may sometimes occur in the posterior part of the orbit, producing exophthalmos and ecchymosis of the eyelids. It is seen also in the form of petechiæ and may occur from the bowel. One of the most frequent forms is, in the author's opinion, from the kidneys. In severe and long-continued cases a progressive anemia and cachexia develop. The expression is one of constant pain. The child may sleep but little on account of the suffering. Edema of the parts involved is often very decided, sometimes with a marantic edema of other parts. Fever may be present in moderate amount, appetite is diminished, diarrhea not uncommon; or there may be constipation. Without treatment there is but little tendency to recover.

A RECORD OF THE FIRST 500 CASES CARED FOR AT THE NATHAN STRAUS INFANTS' MILK DEPOTS OF WASHINGTON, D. C.*

BY LOUISE TAYLER-JONES, M.S., M.D.,
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Twenty years ago infants' milk depots were a new institution. Today, twenty-eight cities in the United States alone are provided with this one means of saving the lives of their babies.

Independently, but simultaneously with the founding of a depot in Hamburg in 1889, another was started by Dr. Koplik at the Eastern Dispensary, New York City. A third laboratory was opened in Paris in 1892, and another was established by Mr. Nathan Straus in New York City in the same year. Since then many have been opened here and abroad, several of them by Mr. Straus. His most recent philanthropy in this line has been the laboratory, which he decided to open and maintain, at least for a time, in order that it might demonstrate what can be done in allaying infant morbidity and lessening the infant mortality of Washington. The officers of the United States Public Health and Marine Hospital Service and the Health Officer of the District of Columbia have been very much interested in the laboratory and its success, scientifically and practically, and have coöperated in every way. It was through them that the writer has had charge of the babies in daily consultations.

This report shows the result obtained from such records as have been made of the babies coming to the main station or one of the six sub-stations, from April 25, 1910, to October 1, 1910. There were 506 babies during that time.

Before giving our attention to the babies and their records, it may be well to consider the means and methods of providing a proper milk.

The milk—or the bulk of it—comes from a farm about five miles out in Virginia. The dairy buildings were constructed mainly in accordance with plans from the United States Department of Agriculture. The cows are grade cattle, tuberculin tested,

* Read before the Woman's Medical Society of the District of Columbia, November 8, 1910.

and cared for and fed according to modern methods. The milk is handled carefully, as shown by the very low bacterial count,* and cooled quickly to 44° F. The milkings of the previous evening and early morning are taken to the laboratory at 1319 H Street, in a gasoline car, and delivered about 8 A.M., so that the morning's milk is ready for distribution by 11 A.M. This same morning's milk is not distributed after 11 A.M. the next morning, a very noteworthy fact, considering the present tendency to refrigerate pasteurized milk. This is an order that Mr. Straus insists upon being enforced. There is every facility for doing the work in the best and quickest way at the laboratory. Everything is white, necessitating careful cleanliness. In addition the place is steamed out daily. The bottles, washed in the afternoon, are sterilized at once. They are left in the sterilizer until the next morning, ready in their racks to be placed in the bottle filler.

Besides the pint bottles of whole milk and the bottles of barley water in two sizes (three-ounce and six-ounce bottles), there are five milk modifications made.

They are as follows:

Formula No. IV. (Dr. A. R. Green.) Fat 1 per cent., Sugar 5 per cent., Proteid 0.50 per cent.

16 per cent. cream.....	¾ ounces
Whole milk	3 "
Water	19 "
Lime water.....	1¼ "
Milk sugar.....	1½ "
3 ounces, 8 feedings.	

Formula III. (Dr. R. G. Freeman.) Fat 2 per cent., Sugar 6 per cent., Proteid 1 per cent.

16 per cent. cream.....	2 ounces
Whole milk.....	4 "
Water	17 "
Lime water.....	1 "
Milk sugar.....	1⅓ "
3 ounces, 8 feedings.	

* During the summer bacterial counts were made by the U. S. Department of Agriculture, the Board of Health of the District of Columbia, and a bacteriologist employed by the Laboratory.

Formula IIp. (Dr. R. G. Freeman.) Fat 2 per cent., Sugar 7 per cent., Proteid 1.8 per cent.

Whole milk.....	18	ounces
Water	16½	"
Lime water.....	1½	"
Milk sugar.....	1½	"

6 ounces, 6 feedings.

Formula IIb. (Dr. A. Jacobi.) Fat 2 per cent., Sugar 7 per cent., Proteid 1.8 per cent.

Whole milk.....	18	ounces
Barley water.....	18	"
Cane sugar.....	1	"
Table salt.....	20	grains

6 ounces, 6 feedings.

Formula I. (Dr. A. F. Hess.) Fat 3 per cent., Sugar 6 per cent., Proteid 2.4 per cent.

Whole milk.....	32	ounces
Barley water.....	16	"
Milk sugar.....	2	"

8 ounces, 6 feedings.

After these formulæ are mixed carefully in sterilized vessels, they are bottled by machine and capped. They are at once heated to a temperature of 150° F., the small bottles being kept in the pasteurizer for thirty-five minutes, the larger ones for forty and forty-five minutes. After removal from the pasteurizer, the bottles are cooled quickly first by spray, then by iced water, and finally placed in the ice-box. This is accomplished by 11 A.M., and the milk is ready for distribution from the main station. From there some of it is taken to the sub-stations, covered with chopped ice.

Over a thousand bottles are put up daily. The number of bottles given or sold by months is as follows:—

May	8,532
June	16,832
July	29,388
August	31,288
September	28,885

Total for the five months of distribution 114,925.

In October there were as many bottles distributed as in July, showing that there are new babies to take the places of those who have graduated from the milk.

Distribution.—The milk is sold at one cent a bottle for the small bottles, making eight cents for a day's feeding. The larger (6 ounce and 8 ounce) bottles are one and one-half cents each, costing nine cents a day for six feedings. The charge for pint bottles of whole milk is four cents. There is a deposit required on all bottles and stoppers; this is refunded on return of the bottles. No milk is given out free without a request from the Associated Charities, a physician to the poor, or an instructive visiting nurse. It may be bought for any baby. The fact that it is not delivered, but must be called for, eliminates practically all except those who are ill, poor, or unable to get other good milk. It means a sacrifice of time and trouble to obtain it, and therefore it is obtained only by those who feel some special need.

Consultations.—During these five summer months there were daily consultations at the main station, where 216 babies came for milk. A card was kept for each baby in attendance at the main station and the sub-stations, and an effort made to have it show the date of beginning the milk, name, age, race, sex, parents' name, address, whether breast-fed and for how long, other foods, and immediate condition of baby. At its first consultation the baby is examined and weighed, inquiry is made regarding stools and habits, and advice given regarding bathing, clothes, fresh air, etc. They are advised to come once in two weeks, if well; once a week if needing attention; and anywhere from daily to semi-weekly, if ill.

In cases where the baby is under the care of a physician outside, his orders are carried out and advice about feeding is given only at his request.

It has been found that most of the babies, after getting well started—so many are ill when they first come to us—can change gradually from one regular formula to the next, and on through to whole milk. This is not accomplished by changing all the bottles in one day from, say, No. III. to No. IIp. One bottle of No. IIp. is substituted for No. III. one day, a second the next day, and so on till all are changed. If it seems best, the changes are made on alternate days, or perhaps only twice a week. However, where the usual formulæ are found not to fit the baby, a

special formula is prescribed and put up as long as requested by the writer. The superintendent not only did this most willingly, but took a keen interest in seeing the baby get a food that it could digest and assimilate.

Sub-stations.—Beside the main station (the laboratory), there are six sub-stations or depots. They fairly well cover the greater part of the city and are as follows:

I. Colored Social Settlement.....	42 babies
II. Freedmen's Hospital.....	60 babies
III. Friendship House.....	46 babies
IV. Georgetown University Hospital.....	38 babies
V. Infants' and Children's Dispensary...	55 babies
VI. Noel House.....	49 babies

Of these 290 babies, 154 are still taking the milk (November).

All free milk at two of the stations, Noel House and Infants' and Children's Dispensary, is paid for at the rates mentioned above, by the Diet Kitchen. The Diet Kitchen has been filling this need at these two places since April, 1908, when they first added this work of supplying modified milk for babies to their efforts along other lines. The free milk at the other sub-stations is covered by Mr. Straus's charity.

Most of the sub-stations have a physician in attendance on from one to six days a week, and each has a nurse to look after the babies and their milk. In nearly every place the nurse is an instructive visiting nurse, and where such is the case the care and attention are very satisfactory, and the milk is properly distributed.

The superintendent of the instructive visiting nurses has co-operated in every way possible with the Straus laboratory. It is, naturally, a great help to her nurses in their work to be able to supply a proper food to the poor babies under their care, but on the other hand their services to the laboratory have been inestimable. Where the writer has asked that cases be followed up in their homes in order to correct existing conditions or to instruct, the results have always been manifest, and in more than one case a life has undoubtedly been saved. In fact, the instructive visiting nurse is undoubtedly one of the very strongest

factors in the amelioration of suffering among the poor of Washington.

Report of Cases.—There was a total of 506 cases from the opening of the laboratory, April 25, 1910, until October 1, 1910. Of these 506 babies 295 were whites and 211 colored, making a proportion practically of 3 white for every 2 colored babies. (See Chart I.) There were 135 babies over one year of age and

CHART I.

ALL BABIES (DEAD, DISCONTINUED AND STILL UNDER OBSERVATION)
CLASSIFIED ACCORDING TO RACE, AGE, LENGTH OF TIME
TAKING THE MILK AND BY WHOM REFERRED.

	Total	Race		Age				On the Milk						Referred by			
				White		Colored		Over 1 mo.			Less than 1 mo			Doctor	Nurse	Other Sources	Un-known
		White	Colored	Over 1 yr.	Under 1 yr.	Over 1 yr.	Under 1 yr.	White	Colored	Total	White	Colored	Total				
Dead	51	14	37	0	14	4	33	6	14	20	8	23	31	22	10	7	12
*Discontinued..	262	149	113	50	99	33	80	64	41	105	85	72	157	113	36	32	81
Still taking the milk.....	193	132	61	36	96	12	49	132	61	193	0	0	0	68	31	34	60
Total.....	506	295	211	85	209	49	162	102	116	318	93	95	188	203	77	73	153

371 under one year of age. There were 318 babies who remained on the milk one month or longer, and 188 who stopped taking the milk before they had had it for one month. There were 103 babies definitely known to have been fed previously on condensed milk, and of the 67 babies known to be illegitimate, 13 were white and 54 colored. It may be noticed that nearly half of the babies came for the milk on the advice of a physician.

Of the different groups into which they have been divided, probably the most important one to discuss in detail is the deaths.

Mortality Record.—Among the 506 cases there were 51 deaths, and of the 318 babies taking the milk one month or more, 20 died. The length of time they were on the milk may be noted in Chart II., which also shows the age, race and condition, and the fact that so many were critically ill. (See also Chart III.)

Conclusions Regarding the Deaths.—On reviewing the cases, several points may be noted.

* See Chart V.

CHART II.

DEATHS, SHOWING RELATION BETWEEN TIME OF TAKING MILK,
CONDITION WHEN RECEIVED, RACE AND AGE AT DEATH.

		On milk less than 1 day	On milk 1 to 6 days	1 Week	2 to 4 Weeks	1 month	2 months	3 months	5 months	Total
Deaths		3	13	7	8	9	5	5	1	51
Condition when received	Healthy	.....	.....	....	....	....	1	....	1	2
	Slightly ill	.....	.....	1	1	....	2	1	....	5
	Ill	.....	.....	1	3	3	2	2	....	11
	Very or critically ill	3	13	5	4	6	....	2	...	33
Race	White	.....	5	3	....	3	3	....	....	14
	Colored	3	8	4	8	6	2	5	1	37
Age at Death	Under 1 wk.	.....	.....	....	....	....	....	....	....	0
	1 wk. to 2 mos.	.....	2	....	1	....	....	....	....	3
	2 mos.	.....	2	....	1	2	....	....	....	5
	3 mos.	.....	3	....	....	4	....	....	....	7
	4 mos.	.....	1	2	2	....	1	....	....	6
	5 mos.	.....	1	4	....	....	1	2	....	8
	6 to 8 mos.	1	2	....	1	....	1	1	1	7
	8 mos.	1	1	1	2	....	1	1	....	7
	9 mos. to 1 yr	.....	.....	...	1	2	....	1	....	4
	Over 1 yr.	1	1	....	...	1	1	....	....	4

CHART III.

DEATHS, SHOWING PERCENTAGES ACCORDING TO RACE AND LENGTH
OF TIME ON MILK.

	Total.	White.	Colored. -
All deaths.....	51 = 10.0%	14 = 4.7%	37 = 17.5%
Deaths of babies on milk 1 month or more..	20 = 6.2%	6 = 2.9%	14 = 12.0%

1. Although 10 per cent. of the total died, only 6 per cent. of the babies for whom we had a chance to do much, *i.e.*, who had been on one month, died. (See Chart III.)

2. All deaths of white babies to the total whites, 4.7 per cent. All deaths of colored babies to the total colored, 17.5 per cent.

3. All deaths of white babies on one month to the total white babies on one month, 2.9 per cent. All deaths of colored babies on one month to the total colored babies on one month, 12 per cent.

4. Nearly all babies were from very unhygienic homes.

5. Many were known to be condensed milk babies and practically all had been improperly fed.

6. The majority was very ill or critically so when first coming to us.

Infants Still on the Milk.—There seems to be little to say about the 192 babies that are still taking the milk. They are, naturally, doing well, and with the cold season at hand have a better chance of continuing so.

There were quite a few who made prodigious gains, like 8 pounds in five months, or 10 pounds in six months, but the average baby usually gained continuously, moderately and satisfactorily, and with improvement in every way.

Discontinued.—There are, up to date, 262 babies of the 506 total, who have stopped getting the milk. These the writer has divided into six sub-divisions (see Chart IV.) as follows:

The babies who

I. Left town, 33	{ White, 21 Colored, 12	On over one month, 21 On under one month, 12
II. Recovered or for age, 19	{ White, 9 Colored, 10	Over one month, 11 Under one month, 8
III. Returned to nursing, 7	{ White, 5 Colored, 2	Over one month, 4 Under one month, 3
IV. Ordered stopped by physicians, 6	{ White, 6 Colored, 0	Over one month, 2 Under one month, 4
V. Were sent to homes or hospitals, 10	{ White, 5 Colored, 5	Over one month, 4 Under one month, 6
VI. Remain unaccounted for otherwise, 187	{ White, 103 Colored, 84	Over one month, 63 Under one month, 124

I. There were several who left town whose final condition was not satisfactory.

II. The recovery cases need few words. They were ill when they came to the consultations and started on the Straus milk, and discontinued as soon as they were entirely well. One of them, James L., was only on barley water. On recovery from illness he went back to nursing his mother, with some good advice thrown in.

III. The babies who went back to nursing their mothers was a very gratifying group. One woman was persuaded to give up her work in order to nurse her baby.

IV. Of this group, the babies were taken off the milk for various reasons. In one case, the physician wanted another milk and another formula; a second did not give a reason; the third had the family get a goat; and the fourth and fifth would not allow the Straus milk to be used at all. The last 3 died between two weeks and one month after discontinuing the milk.

V. These babies who were sent to homes or hospitals were for the greater number taking the milk for a short time. Of the 10 babies, 5 were found to be hospital cases and were advised at once to go to the hospitals. Of the others, 2 were taken by the Board of Children's Guardians, 2 by St. Ann's Asylum, and one was adopted. Most of the cases have not been followed, but one of this group, G. C., six weeks old, who was on the milk one day and then went to Children's Hospital, died ten days after admission. It seemed remarkable that he could last so long.

VI. The sixth and last group of babies who have discontinued the milk form the largest group. About 80 of these came anywhere from one to five days and then stopped. The cause was not stated, but in the majority of cases it was undoubtedly the inconvenience of sending for the milk. It can readily be realized that many families would find it a real hardship or a real impossibility to send for the milk; indeed, in many cases the regular attendance is accomplished by much sacrifice on the part of the parent, but for the sake of obtaining a good food for the baby.

Another set of babies, about 25 in number, came all summer and continued well throughout that season. They discontinued with the advent of cold weather, when they were a year old or nearly one year of age. Several (10) discontinued through leaving the hospital (Freedmen's) or through receiving no more free tickets. Five moved too far away from any depot. One of these had received modified milk at Camp Good Will. Yet another set (25) was of babies that grew much stronger or recovered from illnesses, but the parents had to stop because they had no one to send for the milk. The milk was gotten for 2 babies for a railroad trip only, and in 12 cases the babies were reported as refusing to take the "bottle" or refusing to take the "milk." In 2 of these cases the nurses reported it as laziness on the part of the parent. Two more cases were put down as "failures." About 15 babies belonged to unusually

shiftless families, who would come irregularly and finally stopped because the babies were doing well and it was too much trouble to come for the milk.

CHART IV.

DISCONTINUED CASES (BY NOVEMBER 1, 1910) CLASSIFIED ACCORDING TO RACE, AGE AND LENGTH OF TIME OF TAKING THE MILK.

	Total.	Race.		Age.				Taking the Milk.					
		White.	Colored.	White.		Colored.		Over 1 month.			Under 1 month.		
				Over 1 year.	Under 1 year.	Over 1 year.	Under 1 year.	White.	Colored.	Total.	White.	Colored.	Total.
I. Left town	33	21	12	7	14	2	10	15	6	21	6	6	12
II. Recovered or for age.....	19	9	10	7	2	2	8	4	7	11	5	3	8
III. Returned to nursing.....	7	5	2	0	5	0	2	3	1	4	2	1	3
IV. Ordered stopped by physician.....	6	6	0	0	6	0	0	2	0	2	4	0	4
V. Sent to homes or hospitals.	10	5	5	0	5	1	4	4	1	4	1	5	6
VI. Remainder.....	187	103	84	36	67	28	56	36	27	63	67	57	124
Total of cases discontinued....	262	149	113	50	99	33	80	64	41	105	85	72	157

Of this large group VI., 4 are known to have died finally. One was very ill and received the milk one day on the advice of a physician. It died twenty days later. A second had scabies, boils, intestinal trouble and whooping-cough and came irregularly for the milk. About twelve days after discontinuing the baby died of "gastroenteritis."

It seems hardly fitting to close without a small tribute to those who have helped make the work successful. All physicians have given their time and the assistance has been appreciated. The enthusiasm and ability of the superintendent, Miss Hurn, has done so much for the success of the work, not only in the proper handling of the milk, but in gaining the coöperation of the mothers. The interest, advice and support of the health officer, Dr. William C. Woodward, has always eliminated difficulties that have otherwise seemed insurmountable in the establishing of a large milk laboratory and adapting it to the needs of Washington.

During the short time of observation—six months—the writer has endeavored to judge conditions carefully and impartially. Another six months will demonstrate very conclusively many points, but, in the meantime, the supply of a good, properly modified milk, medical supervision and nurse's care have worked a success which is convincing to those who have seen the babies.

MALARIAL FEVER IN CHILDREN.

BY E. G. WHERRY, M.D.,

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For the last few years there seems to have existed an impression that the diagnosis of malaria in children has been made too frequently. So strong has this impression been that many physicians hesitate to make such a diagnosis until, by a process of elimination, all other possibilities are ruled out. Even when a tentative diagnosis of malaria is made, it is not infrequently rejected when, upon examination of the blood, no malarial plasmodia are found. When, in a situation by no means uncommon, to the negative result of the blood examination is added the absence of an enlarged spleen, the diagnosis of malaria is still more likely to be rejected. Then, other diagnoses having been previously excluded, nothing is left but to treat the case symptomatically.

This may result in a slow recovery, though it is likely to leave the patient anemic and worse for wear and tear until, when the case is about forgotten, a renewed attack once more demands the physician's services. As in scarlatina a diagnosis is easy in a typical case, but often almost impossible in an atypical one until desquamation takes place or other members of the household are infected, so a typical case of malaria, with an enlarged spleen and the presence of the plasmodium in the blood, cannot, of course, be mistaken for any other disease; but it is very different in the atypical, irregular, complicated cases which the practitioner frequently meets. But as in atypical scarlatina we have desquamation to help us out, so in atypical malaria we have a test equally simple and equally satisfactory in the action of quinin.

It has been quite thoroughly proven that while quinin has little or no favorable influence upon other diseases, it is, when properly administered in sufficient doses, a specific in malaria. Hence it is advisable in puzzling cases of irregular fever to try the affect of this drug before being too sure that malaria does not exist.

As in adults, so in children, malaria appears in the tertian, quotidian and estivoautumnal types. The quartan type, on account of its rarity in this country, may be disregarded.

The tertian parasite takes forty-eight hours to complete its cycle of development, and hence produces a paroxysm every sec-

ond day. But this happens only when there is a single infection, and it is more common in children to have a double infection, the parasites maturing on alternate days causing a daily paroxysm, thus producing the quotidian type. It is in the estivoautumnal type that most of the puzzling cases occur. Generally speaking, malarial fever may be remittent or intermittent; or it may be irregular, the temperature falling and rising, but seldom reaching normal. It may be mistaken for bronchitis, influenza, intestinal toxemia, enteric fever, etc.

If the diagnosis were correctly made in all such cases, I am convinced that malaria could be shown to be more common in young children than in adults, although the contrary belief is widely entertained. The symptoms vary somewhat according to the type present, typical cases in all the different forms presenting, of course, characteristic features. Thus there may or may not be a chill; in children over five or six years of age it is usually present. This may be associated with headache and general pain, nausea, sometimes vomiting, and a feeling of general malaise. In infants under four or five years the chill may be absent or pass unnoticed; but there is vomiting, sometimes profuse and persistent. The child is pale, sleepy and prostrated. The extremities are cold, the eyes dull and apathetic, the lips and finger tips blue, the face often anxious and drawn. Then follows a rapid rise of temperature to 104° F., or 105° F., sometimes higher. This lasts for a variable time, seldom less than three or four hours, not often more than ten or twelve, falling gradually, usually to normal. The constitutional symptoms ordinarily are not so pronounced as in other diseases with a corresponding elevation of temperature.

The sweating, following the fall in temperature, is not nearly so marked as in adults, and sometimes appears to be absent altogether. After the first paroxysm, the child may appear quite normal for several hours, all the symptoms disappearing until the next paroxysm, which occurs, generally, in a less pronounced form than the first one. There is not always a well-defined regularity in the intervals between the paroxysms, nor is there any precise time of day when they may be expected. The oscillations of temperature are pronounced. It may be remittent or intermittent, or it may become intermittent after having been remittent. The case may resemble one of continuous fever, but it is rare that the temperature does not drop to normal at some time during the twenty-four hours. Enlargement of the spleen is regarded by most au-

thorities as a fairly constant objective symptom, but upon the question of how often such an enlargement can be determined by palpation there is some difference of opinion. Holt says, "Enlargement of the spleen is present in the great majority of cases, and usually to a sufficient degree to be readily appreciated by examination." John Ruhräh, in Carr's book, says, "If the spleen cannot be felt in a child, some other explanation of the fever should be sought for." Le Grand Kerr says, "Too much emphasis has been usually laid upon the value of an enlargement of the spleen in the diagnosis of malaria in children. Such an enlargement occurs in many of the diseases of infancy and childhood. At times it is very difficult to demonstrate, being present in but a slight degree. As an aid to the diagnosis of malaria it is practically nil unless associated with it there are manifestations of periodicity." From my own experience I am led to the conclusion that, as in diphtheria, there is always a membrane present if the case has been allowed to progress without treatment, so in malaria there is usually an enlargement of the spleen under the same circumstances. But as in diphtheria it is possible, by means of a culture taken early in the course of the disease, to make a diagnosis, and by means of a specific antitoxin to abort the disease before the formation of a membrane, so in malaria I believe it possible by the proper administration of quinin to cut short the attack and at the same time to establish a diagnosis, in many cases before a palpable enlargement of the spleen results.

The irregular types of the disease are the ones most frequently overlooked, and are the most common in children. Their irregularity makes them difficult to describe. Perhaps the most distinctive symptom is the periodicity of the temperature, which oscillates, perhaps at regular intervals, possibly at irregular intervals, but which is always high, and sometimes very high at some period during the twenty-four hours, but never constantly high. The occurrence of a well-marked intermittent fever in a child, where pyelitis is excluded by the absence of pus in the urine, is extremely suggestive of malaria; but the well-marked intermittent fever is the exception, not the rule. On the other hand, we almost always find a marked periodicity. This then is possibly the first symptom to help us in a diagnosis. Next to this in importance, in most cases, is the general appearance of the patient. It is seldom that the child seems as ill as one would expect from the severity of the temperature.

This condition, associated with the periodicity of the temperature and the absence of other well-defined diseases, points strongly to malaria. An examination of the blood should now be made, and if the plasmodium is found, the diagnosis is determined; but it must be borne in mind that a negative result does not exclude the disease.

It requires both experience and care to examine the blood for malaria. Frequently a dozen examinations may show a negative result before a positive one is obtained. The blood should be taken during a paroxysm, and before quinin has been given. Both fresh and stained specimens should be examined.

If, upon examination, it is now found that the spleen is enlarged, even with a negative result from the blood examination, malaria should be the diagnosis. If there should exist no palpable enlargement of the spleen, the periodicity of the fever alone should suggest malaria, and warrants the use of quinin for test purposes. A fever which yields promptly to quinin is probably malaria. A fever which does not promptly yield to quinin is something else.

To illustrate the difficulties of making a diagnosis in the ordinary atypical malaria, I shall refer to a few of my own cases:—

CASE I. A boy eighteen months old, a victim of faulty feeding and poor habits, who had had frequent attacks of acute intestinal disorders, some of them accompanied by convulsions, was taken suddenly with a convulsion accompanied with a temperature of 105°F., and a coated tongue and constipation. It could not be proven that anything indigestible had been recently eaten. A few whiffs of chloroform, a hot mustard bath, an enema and 2 grains of calomel were followed next morning by a temperature of 97°F. I considered the case one of acute intestinal indigestion. In the afternoon I was again called in, and found a temperature of 106°F., a profuse discharge from the nose, coarse râles throughout the chest, and an area of congestion at the right apex. This being accompanied by a cough, pneumonia was suspected; but as the ratio between the respiration and the pulse was not much disturbed, a diagnosis was not given. The spleen could not be palpated; the blood examination was negative. The child was given 2 grains of quinin every two hours for five doses, beginning when the temperature dropped, which was at 2 A.M. The next day the highest temperature was 99°F., the lungs were clear, and the coryza improved. The same dosage was continued the

following day, by which time the child was apparently perfectly well. The mother now took it upon herself to discontinue the quinin. There was a slight fever that night, and the next day (the fifth of the disease) the temperature was 104°F. , the child's extremities cold, the face drawn and pinched, the lips blue, with slight twitchings of the mouth and hands. The quinin was given as before for three days, then changed to 2 grains three times daily for ten days, during which time, and for a year or more after, the child was perfectly well. A subsequent attack, with much the same symptoms, then developed, and yielded promptly to the same treatment.

CASE II. A boy four years of age. His case had been diagnosed as acute intestinal toxemia, accompanied by bronchitis, with slight congestion of the lungs, but no consolidation. Calomel was given in divided doses, followed by castor oil and rectal irrigations, the diet being restricted to diluted milk. The child did not appear alarmingly ill, but the temperature rose to 104°F. , and sometimes to 105°F. , every afternoon. It was generally near normal in the morning. At this stage the case was seen by a New York pediatrician, who confirmed the diagnosis, but changed the diet to one of cereal only. At the end of eleven days there had been no change. I was then called to see the child for the first time. His tongue was clean, his general appearance good; there was no enlargement of the spleen, and no bronchitis. There was a slight cough, and a chronic hypertrophy of the tonsils. The examination of the blood and the urine was negative. Quinin was given as in the previous case, with the result that the highest temperature the next day was 99°F. , the lowest 97°F.

CASE III. Two little girls, sisters, convalescing from a moderate attack of measles, had had no temperature for several days; were given ice-cream for Sunday dinner; during the night were restless and feverish; were given castor oil, and appeared much better the next morning.

When seen the next afternoon they were drowsy, hard to arouse, acted as though very cold, and each had a high temperature. There was no indication of pneumonia; the breath was foul, the tongues coated.

Calomel was given, retained by one, and promptly vomited by the other. The following afternoon they were, if anything, worse. The mother said that the younger of the two had a lump in the axilla as large as an egg. I could not find the lump, but the

axillary glands appeared tender. The next morning both girls were apparently well, but the axillary enlargement described by the mother was easily found, and was rather larger than a hen's egg. That afternoon, the temperature having again gone up, the enlarged gland had disappeared.

An examination of the blood was made; this was positive in one case and negative in the other. The spleens could not be palpated, but one girl complained of tenderness on pressure. Quinin was given every two hours for five doses, and the temperature remained normal in both patients from that time on.

CASE IV. A boy five years old, brought to my office, was pale, listless, and presented a generally forlorn appearance. I was informed that he had been ill for about two weeks with a fever, with what variations of temperature I could not ascertain. The main reason for consulting me was that the urine contained blood. His spleen was much enlarged; the blood test was negative. The boy was given 2 grains of quinin every three hours for three days, then *t.i.d.* for two weeks. He improved considerably, but did not altogether recover. He was then given Warburg's tincture, and sent away to the seashore. At the end of two weeks he was again seen, and, except for a slight anemia, appeared well. He was then put on Fowler's solution for one month, after which his mother reported him better and stronger than he had ever been.

I am well aware that these cases are not extraordinary, but they are interesting in so far as they differ from the classic description of acute malaria.

There are subacute forms of the disease characterized by anemia, pallor, listlessness, "growing pains," and other indefinite symptoms. When these symptoms are associated with foul breath, coated tongue, constipation, or diarrhea, they may easily be mistaken for intestinal toxemia. These cases generally show an enlarged spleen, but the examination of the blood, unless persisted in, often gives a negative result. When not treated, acute malaria ordinarily ends in apparent recovery at the end of three or four weeks, only, however, to recur at some future time, or to become subacute, or, it may be, to end in malarial cachexia, a condition characterized by anemia, a pale or muddy complexion, listlessness, capricious appetite, imperfect digestion, irregularity of the bowels, swollen ankles, hematuria, enlarged spleen, cold extremities, frequent slight headaches, loss of weight, etc.

Pernicious malaria I have never seen. It is rare in this

country. It is described by Ruhräh as starting with vomiting, convulsions, and a high fever. The convulsions may continue, or the child become comatose. Cases have been reported where the coma came on with each paroxysm and disappeared when it was over. It would appear that in such cases as these the diagnosis could not well be made except by the examination of the blood. These cases result fatally, unless treated with subcutaneous or intravenous injections of quinin.

The specific treatment for malaria is quinin. The dose should be relatively larger than for adults. My plan has been to give it every two hours for four or five doses daily for three days, beginning when the temperature is at its lowest, or so that the last dose will be taken from two to three hours before the time when otherwise the paroxysm might be expected. For a child of one year 1 grain of the sulphate may be given at each dose; children of eighteen months up to two and one-half years should have 2 grains, children older than two and one-half years from $2\frac{1}{2}$ to 3 grains.

After the third day, if the patient's condition is much improved, the same dosage may be given morning, noon and night. This is kept up for several days longer; then one-half the dose is given at the same intervals for at least one week more.

To mitigate nervous manifestations that may be produced by the quinin, it might be advantageous to combine a small amount of antifebrin with the quinin.

In severe cases, where possibly the diagnosis has been delayed, it may be necessary to crowd the drug. As very large doses are apt to be vomited, it may be necessary to give, in addition to what is taken by mouth, twice the amount by rectum, or, if an immediate effect is imperative, by hypodermatic injection. For rectal use the sulphate or the bisulphate in aqueous solution will be found most useful. This may be given in a small quantity of warm rice water or barley gruel, through a medium-sized soft rubber catheter. To increase the solubility of the quinin 1 grain of tartaric acid may be added to every 5 grains of quinin.

The very few times when I have found it necessary to use the drug hypodermatically, I have employed the bimuriate of quinin and urea, as recommended by Holt. The injection should be made deeply into the gluteal muscles. Induration and some pain may result, but with surgical cleanliness no abscess need be feared. The skin at the point of puncture may be painted with tincture

of iodin immediately before the injection is given. I have had no experience with the intravenous injection of quinin.

In Carr's "Practice of Pediatrics," credit is given Bacelli for the following, both for hypodermatic use and intravenous injections:—

Quinin. bimuriat.	gr. xv
Sodii chloridii	gr. 1
Aq. distil.	℥ iiss

Or, if this cannot be readily procured, the following:—

Quinin. sulph.	gr. xv
Ac. tartaric.	gr. iiss
Aq. distil.	℥ iiss

The general treatment is symptomatic; in the cold stage, warm drinks and a hot bath, with plenty of bed covering; in the hot stage, a hot bath followed by a cold sponge or an alcohol rub down, an ice-bag to the head, and a cool, quiet, well ventilated bedroom.

In chronic cases, tonics, such as arsenic, iron, nitrohydrochloric acid, attention to the digestive tract, supervision of the diet, and change of climate are of benefit.

The prognosis for recovery is good, the disease being seldom fatal in itself, though in neglected cases the powers of resistance may be so impaired as to produce a fatal outcome from some intercurrent disease, such as pneumonia or influenza, or some form of intestinal disease; or, if there are repeated attacks, from pernicious anemia.

As a resident of this state I cannot well conclude this paper without paying my respects to the Jersey mosquito. We all know that he is directly responsible for malaria. I have for a long time believed that he is also indirectly responsible for many cases of pulmonary tuberculosis. It is well known that ordinarily tuberculosis attacks only those whose powers of resistance are lowered. It cannot be doubted that the powers of resistance are lowered by frequent attacks of malaria.

For every \$1,000 now expended for this object, the State of New Jersey could well afford to spend \$1,000,000 if by so doing it could be rid of what has been rightly characterized as one of the most dangerous of all wild animals, the anopheles.

325 Clinton Avenue.

TUBERCULOUS PERITONITIS IN CHILDREN, WITH A REPORT OF A CURE FOLLOWING TWO OPERA- TIONS IN A DRY NON-EXUDATIVE FORM OF THE DISEASE.*

BY JOHN H. BRADSHAW, M.D.,

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The chief object of this paper is to put on record two laparotomies performed on an infant of eighteen months suffering from tuberculous peritonitis without serous exudate and resulting in recovery. The case is noteworthy because it is the serous and not the dry form of the disease that gives the best results from operation; in fact, many operators refuse to operate upon infants with tuberculous peritonitis when there is no effusion in the peritoneal cavity.

This baby gave a history of possible direct intestinal infection. Always a strong boy, he was brought up on the bottle after a few weeks of ineffectual breast-feeding. He began to creep early, and one day caught up from the floor a walking stick and was found sucking the ferule end of the cane until it was taken away from him by his mother, who, with either surprising imagination or acumen, attributed a slight attack of indigestion and malaise that followed to the entrance into his stomach of filth that was evident on the end of the stick. And when we consider the dirty pavements on which the cane was used, with possibilities of expectorations, some slight ground for the mother's rather fanciful idea of infection may be maintained. The child improved under the usual treatment and for several weeks appeared to be in the customary health, with the exception of attacks of colic, for which the writer prescribed, and attributed to some error in its feeding. But as time went on the child began to lose weight and the abdomen seemed somewhat tender to pressure and distended with gas. Its appetite and digestion were much impaired. After about two months several daily attacks of severe abdominal pain would occur. The abdominal wall was now so thin that the distended coils of gut could be distinctly observed, especially at times of colic. A slight evening temperature elevation was now a daily event. The baby looked very ill and was listless, caring nothing

* Read before the First Annual Meeting of the New Jersey State Pediatric Society, Atlantic City, N. J., June 27, 1910.

for its food, seldom having any vomiting, but with bowels being more and more constipated. The distention of the abdomen was now so marked that nothing but the inflated intestine could be made out on palpation. As the greatest pain seemed to be referred to the right abdomen a consultation was held with Dr. E. J. Ill, of Newark, who advised the administration of chloroform, under which a distinct mass of an elongated sausage-shape could be made out in the region of the cecum. Immediate laparotomy was advised and accepted by the parents. An incision was made through the right rectus muscle. The intestines were found matted together with the usual appearance of tuberculous peritonitis. The cavity was absolutely dry and a chain of greatly enlarged mesenteric glands surrounded the cecum like a rosary forming the mass observed before operating. These were so imbedded in plastic exudate and the whole intestines were so matted together that it did not seem feasible to do anything further than to close the wound quickly. The infant was very low and a decidedly grave prognosis was given. However, he made a rapid recovery from the shock of the operation without vomiting, and for a few weeks the whole complexion of the case was changed. The abdomen, which prior to the operation was greatly distended, now became flat and soft—the appetite returned and the bowels acted in a more normal manner than they had in months. This improvement, however, only lasted five weeks. The original symptoms now occurred again—the abdomen became distended, the attacks of colic were more pronounced than ever, the baby refused its food and became emaciated to the condition of a child in the last stages of marasmus. It looked as if death would soon ensue, and it was now that Dr. H. D. Chapin saw the child a number of times. As no internal treatment either by drugs or carefully selected feeding was of any avail, the writer, as a last resort, opened the abdomen, making the incision this time through the left rectus muscle. The same tuberculous appearance of the gut was seen as was found at the first operation, only in a more exaggerated form. The intestines were greatly distended, and many adhesions had to be broken up. The enlarged glands seemed to so surround the ileocecal orifice as to obstruct this opening, and efforts, apparently unsuccessful, were made to free this portion of the intestine, which was tightly bound down. During these manipulations the infant was almost eviscerated, and after considerable difficulty and time the distended gut were replaced in

the abdomen and the wound closed with through and through silk-worm sutures. The baby, who had been placed upon, and surrounded with, hot-water bottles during the operation, was now returned to its crib, with little hopes of its recovery. However, with wonderful vitality it rallied from the second, as from the first, operation. In a few days the highly distended abdomen was flat and soft. The child took its nourishment well and, barring one relapse of distention and pain, gradually put on flesh and strength, until to-day, three years after this illness, he is now absolutely well and strong; in fact, has required the services of the writer but once in the last eighteen months.

Much has been written about tuberculous peritonitis during the last twenty-five years, or since it was first observed by Koenig, in 1884, that laparotomy in these cases could cure. What can we do to prevent it? In other words, What is the etiology? If raw milk causes the disease, should it not be one of the commonest, rather than a comparatively seldom met with, form of tubercular infection? In a personal communication from E. R. Baldwin, of Saranac Lake, he states: "It seems to be somewhat more prevalent in districts where milk is used which contains bovine infection." There is apparently no doubt that tuberculous peritonitis in children arises largely from intestinal infection, and probably milk does have something to do with it.

On the other hand, the human source of the infection is more common in the majority of cases in spite of the opinion of Nathan Raw, of Liverpool, who claims almost everything in surgical tuberculosis, also tuberculous meningitis, to be due to milk infection. There is absolutely no knowledge of a difference in the lesion due to human and bovine origin of the bacilli. Any statements to that effect are due to the imagination of the man who writes them. No recognized pathologist has ever found any difference.

Northrop states (personal communication) that "tuberculous peritonitis may be a part of a general infection beginning in the bronchial lymph nodes, from inhalation, human type. It may begin from mesenteric lymph node infection, from milk in the young especially, and be of bovine type." In children he thinks "more than half of tuberculous peritonitis is probably bovine, due to milk infection by way of the mesenteric lymph nodes."

Chapin states (personal communication) that a vast proportion of cases of tuberculous peritonitis are a secondary and not

a primary disease—the primary focus being in the bronchial glands of the anterior mediastinum, the disease gaining its entrance to the system by way of the bronchial mucous membrane by inhalation. The majority of observers hold that by virtue of their findings in cases coming to autopsy that milk infection must be relegated to a minor position in the etiology of this disease. This belief is further upheld by the fact that bovine tuberculosis is increasing notwithstanding the efforts to stamp it out, while human tuberculosis is notoriously slowly but positively decreasing. If milk infection was a common cause of tuberculous peritonitis, the cases of this disease should increase with the increasing prevalence of the bovine.

Dr. W. H. Park (*Johns Hopkins Hospital Bulletin*, April, 1910, p. 123) states that “in a study of 40 cases of tuberculous infection taken from the Babies’ Hospital, New York City, that he finds over 10 per cent. of the infection due to the bovine type of the bacilli. That human beings may be infected with the bovine type of the tubercle bacillus has long been recognized, the source of the infection being usually milk and butter from tuberculous cattle.”

It is seen, therefore, that although there is a difference of opinion as to the extent of the rôle bovine infection plays in this disease, there is a fairly unanimous opinion that a certain percentage of cases of tuberculous peritonitis arise from milk. This should make us ever vigilant as to character of our milk supply, and not fail to pasteurize that which is of doubtful nature.

As to the diagnosis, Is there any method by which we can identify this disease in its early stages? Baldwin states (personal communication) that “the von Pirquet test in children is certainly one of the most valuable things we have in a tuberculosis test. It has been proven to have a very close relation to a recent infection in children, and, of course, the younger the child the more valuable the test. As to its safety, it hardly needs to be explained that the tuberculin test as used by the skin method has absolutely no danger. In the first place there are no germs in the tuberculin; in the next place it does not cause any general reaction unless great carelessness be used and an actual injection be given through the scarification with the water first and then the two tuberculin spots. If no reaction occurs on the first test he waits a week and gives another one in the same place. Then if no reaction occurs he considers it sufficient evidence of the absence of the disease.

Naturally there are conditions in which the tests are not successful, such as during a course of measles and where the child is very much emaciated or very low in general condition. It seems that in measles or convalescence from a recent disease the reaction may be in abeyance so that it does not reveal itself."

As to the cure of the disease, the last twenty years have seen a growing sentiment with a few exceptions in favor of operation. This paper was not written to expound this fact, which has been strongly advanced by such men as Parker Syms, Marcy, Rotch, Murphy, Ochsner, Deaver, Halsted, the Mayos and by almost every writer of note. Murphy, quoted by Parker Syms, "Annals of Surgery," Vol. XLVI., p. 104, believes that surgery in the adhesive variety is of little avail. And it is seldom in the literature, which is now voluminous, the writer has been able to find the operation recommended for the dry form of tuberculous peritonitis. It was therefore thought worthy of notice and that the case herein detailed should be put on record.

Why the operation cures the disease has been subject of much speculation and several theories. It was held by McBurney that it was due to changes in the vascular supply of the diseased tissue—pressure being relieved, the tissues receive a larger supply of fresh blood. ("Annals of Surgery," Vol. XXV., p. 739.)

27 High Street.

MITRAL STENOSIS IN CHILDHOOD.—F. J. Poynton (*Clinical Journal*, July 21, 1909) says that the treatment of mitral stenosis in childhood is mainly the treatment of rheumatism. The parents should be warned of the meaning of sore throats, fleeting pains, nervousness and chorea, feverishness and pallor. If possible, such children should be taken from damp, low-lying houses, and properly clothed and their extremities protected. Large, unhealthy tonsils should be enucleated. Spring and autumn, and particularly sudden damp cold after much heat, should be a signal for added watchfulness. Early symptoms should be promptly treated by rest and warmth and the use of salicylate of soda.—*American Journal of Obstetrics.*

INFANT MORTALITY IN SUMMER: HOW TO CONDUCT A SUCCESSFUL CAMPAIGN AGAINST IT.*

BY ARTHUR STERN, M.D.,

Elizabeth, N. J.

It is one of the great achievements of the last three decades in medicine, to carry on a fight against some of the greatest foes of mankind—tuberculosis, carcinoma, sexual diseases, and the enormous infant mortality which decimates yearly the children especially of the poor in our larger cities. While it is of course of great satisfaction to know that a good deal has already been done within a comparatively short time, there is however a lack of results in our efforts to do away with the large yearly death rate of the children of our congested cities. With 16,000 infant deaths annually in New York, a small city dying yearly within a city, with more deaths in Germany within one year of cholera infantum than of cholera Asiatica within fifty years, the question arises: Are we really doing all in our power to fight this formidable enemy, who plays havoc with the lives of the children of our nation? In order to get a clear idea of our question we must have in mind what has been done to do away with this large mortality, what has been the result, and have our efforts been altogether toward the right direction. We may classify our work into three groups, first the education of the people and mothers by lectures and distribution of literature and free advice in dispensaries or so called *Fuersorgestellen*; second, the rational survey and production of milk, a proud achievement in the history of our own state; and third the creation of hospitals, asylums, seashore homes and free-air schools for the healthy and sick nurslings and infants. And what has been the result of this campaign? There is no doubt that a good many lives have been saved. Rochester lost 6,629 children under five years of age in nine years. In the next nine years, by the establishment of milk dispensaries and attention to the general milk supply, they have succeeded in cutting down the number of deaths to 4,403, the saving of 2,000 lives. Budin, in 1892, started in Paris the first *Consultations de nourrissons*, which were initiated in a good many cities in Europe and in which the mothers were taught and instructed how valuable it is for the child to be nursed by the mother and where they received advice after the children were weaned. It is interesting to see the effect

* Read before the First Annual Meeting of the New Jersey State Pediatric Society, Atlantic City, June 27, 1910.

on the mortality with and without *Consultations de nourissons*. There is no doubt about the influence it had on the mortality, but there is still a great death rate in each city to account for. It is unnecessary to go into details and dwell on these points any longer or look at the statistics of our larger cities; with every coming summer we know that our death rate will increase, and year after year we noticed the same factors, as preëminent in this great dying of infants. First we know that four-fifths of all deaths occur in the poorer districts of each city, the so-called tenement-house districts. Second that the death rate of the artificially-fed children in some years is six times as high as the rate among breast-fed children, and third we know the influence of the heat wave in summer time on the death rate. In 1907, according to the *New York Times*, the New York Milk Committee, under the advice of Dr. L. Emmett Holt, selected a period of fourteen days, of which the first seven comprised the hottest week of 1907, in order to study the immediate and after effects. The average mean temperature of the first week was 78.6° F., and of the second week 76.4° F. In the three tenement-house blocks sixteen deaths, or 4 per cent. of the total number of infants known to have been born during the year, died during the two weeks—nine during the first week and seven during the second. Had a similar death rate prevailed during the rest of the year the mortality would have been more than 100 per cent. In the four middle-class blocks and in the twenty-eight wealthy residential blocks of approximately the same population no deaths were recorded. Now, the question arises, Why does the child of the wealthy parents, undoubtedly frequently artificially fed, have a better chance than the tenement child? In fact we know that the nursing mothers of our wealthier classes, due to their social conditions, are very often not able to nurse their children and frequently are glad to wean their babies. On the other hand we frequently see that the breast-fed child of the tenement district is not immune from cholera infantum. Apfelstedt, in 1906, states that during seven years of a large practice in the north of Berlin in the tenement-house district he saw numerous fatal cases of cholera infantum in breast-fed children, and during two and one-half years while he took care of the practice of a physician in the west and southwest of Berlin, the fashionable quarters, he saw none. Furthermore he has found another peculiarity; he states that the most severe form of cholera infantum starts most always after the hottest period of summer, some-

times several weeks later and among children of the same quarter of a city, who do not come in contact with each other, who are fed in the most different ways. During the same time he was physician of a nurslings' home in Berlin and he found that in some years they had no deaths of cholera infantum, in some others the epidemic, if I may use this word, was benign, as they lost only two children, but in one year they lost seven nurslings in two days and two after a sickness of from twelve to eighteen hours, and, characteristically, among these victims were two healthy breast-fed children whose mothers were perfectly healthy and remained so. The autopsies of the dead children showed little, as usual, but the presence of a fly in the pharynx of an artificially fed child and of a fly in the stomach of a breast-fed child. Now it is nothing unusual to find flies in the feces of children, and we know that flies are carriers of a good many germs and probably have more to do with the spreading of infectious diseases than we imagine, yet, with all these apparent contradictions, we notice that a severe infection takes place sometimes where several children are under the same roof and sometimes where they are distributed over a large area within a city. Such a violent infection should certainly not be possible in a breast-fed child, and there must be other conditions present, among which the introduction of pathogenic germs from various sources seems reasonable. The introduction of such carriers must then come either from the hands of the mother or caretaker or most frequently probably from the transmission of violent cultures of bacterium coli by our ordinary house fly (*musca domestica*). Whoever has practiced among the poorer classes knows the negligent way in which mothers treat the defecations of their children. Often we see that the young mother first cleans the baby, handles the soiled napkins and then nurses the baby or prepares the food without washing her hands. The biology of bacterium coli is still in the dark, but we know that it can change from a benign into a most violent germ and the school of Lyons in France has shown that the bacterium coli in fermenting human feces is the most violent one. Our ordinary house fly undergoes a perfect metamorphosis, which takes place from beginning to end in the feces of animals or human beings. The eggs are deposited there, the larvæ live on the fecal matter and get along best when these are stagnant at a certain temperature, just when the bacterium coli develops its fullest virulence. It always has seemed to me in my practice, almost with mathematical ex-

actness to be the case, that my fatal cases of cholera infantum have been in houses and rooms abundant with flies. Apfelstedt, in a very interesting article on the fight against infant mortality published in 1906, states that the flies prefer those ill-ventilated rooms which reek of feces and dirty ill-kept human beings. Every one has had the experience that a child has had a slight intestinal disturbance and suddenly this same child develops a high temperature and dies, with or without treatment from a real septic gastroenteritis. It always seemed to me that an additional infection of a violent nature was added to the already established mild intestinal disturbance. Last year I saw a perfectly healthy child, which was brought under conditions where it had to be in the same room with an infant suffering from cholera infantum, develop one of those severe septic forms of gastroenteritis and succumb to it with the question open whether the infection came through the hands of the caretaker or from contact with flies, which were abundant in the room. Apfelstedt, in his article demands: First, public instruction of mothers and nurses on the hygiene of defecation. Second, rigid protection of houses and rooms from flies by frequent ventilation, cleanliness and mosquito frames. Third, continuous observation and care of nurslings. But it seems to me that it will be impossible to be successful in this fight if the physicians and Boards of Health do not coöperate at the same time. The majority of all cases, as we have seen, are among the poorer classes, where the mothers are confined by midwives and cannot afford the services of the physician. These midwives are frequently illiterate and have no knowledge of the primary laws of hygiene of the growing baby. They perform their duty in delivering the woman and take care of the baby during the first week, frequently advising the new mother, if the milk supply in the breast seems inadequate, not to bother with the natural supply and remove the baby from the breast without waiting for nature to regulate the natural flow of milk. George T. Grinnan, in a paper on infant mortality, states that in Chicago, in 1904, 86 per cent. of all births were reported by midwives. In New York City, in 1905, 43,804, or 42 per cent. of the whole number of births, were attended by midwives. Of 500 midwives visited, less than 10 per cent. were capable. These women, he says, determine the feeding and are responsible for much unnecessary weaning. No instruction as to infant feeding or nursing is given. No caution as to the danger of cow's milk in hot weather is given.

Grinnan wants the midwife to be supplied with literature and to receive proper instructions. But it seems to be insufficient if the state where the midwife practices does not demand in the examination a proper knowledge of infant hygiene, and the ideal would be, if all midwives could be forced by law to attend annually, a practical course on infant hygiene with demonstration given by physicians or by an exceptionally intelligent midwife, who has been instructed and trained for this purpose and must be paid by the community. Furthermore, the physician in his daily calls should take time enough to instruct the mother on the hygiene of the baby and tell her that, if she loves her child, she must keep it clean. It needs sometimes a great deal of diplomacy, but it can be done almost everywhere and every little helps. Now the most important duty of our health boards would be to establish laws whereby the physicians would be obliged to report all cases of cholera infantum, and, if possible, the premises of the house where such a case exists should be inspected and the child promptly isolated. We furthermore can demand a regular crusade against the fly, such as we now have against the mosquito. Medical authorities agree that the damage done by the fly is far more serious than that done by the mosquito, at least in our climate. Cities of any size should demand that houses must be connected with the sewer and should have water closets. Stables should be under the supervision of a city department, which, at the same time, should inspect houses which are in the process of erection. We need, as Apfelstedt demands, a municipal building law which insists that permission for the erection of a new building is given if a water closet connected with the sewer is erected for the workingmen. Gustave Temme, in a little work on the social causes of infant mortality, published in 1908, demands (1) free distribution of small printed articles on infant hygiene distributed every summer if possible by the health department. (2) Instruction of the mother by midwives, nurses, special municipal midwives and charity organizations. For this purpose it is necessary to have public free courses for midwives and anybody who wants to avail him or herself of this occasion yearly. (3) Public papers on this subject by good speakers. (4) Similar exhibits as we have had them on the tuberculosis question. (5) Courses in colleges for girls, in cooking-schools, in factories. A municipal midwife or a district nurse as we have them for tuberculosis could do wonders in instructing mothers about infant hygiene, and I

am sure any physician would be glad to employ her services for the welfare of the suffering children. Then there is another point, well worth mentioning, that is, What can the workingman do in this fight against infant mortality? Our present workingmen's associations, which insure their members against sickness and death by giving them a certain amount of money during their illness, and which have among their members a good many intelligent, far-sighted men, would certainly see the importance of this fight if they were approached in the right way and made acquainted with some of the facts concerning summer mortality. By charging each member a few cents monthly they soon could create a fund large enough to employ a district nurse and send her to such families as are highly in need of help and instruction, during the summer months.

It would be a proud undertaking for our state and our young society to be the first in the field to create a permanent exhibit of infant hygiene to be exhibited in different parts of the state. We could show that 300,000 infants perish annually in the United States during the first year, just as many as in the comparatively small country of Germany, where the density of population is of course larger. We could show that of 3,737 infants who died during the first two years only 144 were nursed, 162 received breast and cow's milk, and 2,360 received cow's milk only. We could show that only 10 per cent. of all mothers are unable to nurse their babies and the weakest infants may be raised at the mother's breast. We might show good pictures and wax models of the most frequent infant diseases, of the amounts of the stomach capacity of the different ages to show the danger of over-feeding. We might show the different phases of milk hygiene, dirty and clean milk dairies, and milk depots, and the results of clean milk on infant mortality. We might show in a separate department the hygiene of the nursling, how to keep him clean and to take care of him, and I hope sincerely that, with the help of some charitable men, we will be able to reach this goal. The fight against infant mortality is not alone our fight, it is not our privilege alone. Everybody, laymen and professional men should participate in it. And only then will we have lasting results, when everybody is acquainted with this high and important task and when the people take the same interest in it as in the fight against tuberculosis.

224 East Jersey Street.

TREATMENT OF TYPHOID FEVER WITH SPECIAL REFERENCE TO THE USE OF HYDROCHLORIC ACID.*

BY ALEXANDER McALISTER, M.D.,
Camden, N. J.

The employment of hydrochloric acid in typhoid fever is in no sense new, but, in my opinion, the treatment has never received the attention its unique value merits. It is to be feared that in turning from the confusion of empiricism of the past centuries to the present purely rational treatment, the triumphs of less than a decade, many have simply exchanged extremes by discarding practically all drugs. Fortunately few drugs are required in the treatment of typhoid fever, but the best and foremost of these is hydrochloric acid. My experience with this treatment dates from 1885, the year of my internship at the Pennsylvania Hospital, Philadelphia. Arthur V. Meigs was then chief and an ardent advocate of the hydrochloric acid treatment, which he has employed in this hospital and private practice to the present day.

During the Spanish-American War Meigs employed the treatment in a group of typhoid fever smitten soldiers who had been assigned to the Pennsylvania Hospital. Comparison with similar groups treated elsewhere with baths and other equally modern plans showed the better results for the acid treatment.

The indications for the acid, it seems to me, are clean-cut and emphatic. The rationale is quite as easily mapped out as anything in the forefront of the field of applied therapeutics. The acid is an astringent intestinal antiseptic without being a foreign body in the system. In my experience patients treated with the acid are less apt to develop complications or sequelæ and enter upon convalescence better nourished than when treated without the acid.

Hydrochloric acid is deficient in the gastric secretions of all fever patients, but particularly so in those having typhoid fever. Hence to give hydrochloric acid in the treatment is simply supplying what is absent. It is substitutionary therapeutics, pure and simple.

* Read before the First Annual Meeting of the New Jersey State Pediatric Society, Atlantic City, N. J., June 27, 1910.

In no other disease is the absence of hydrochloric acid so prominent a factor in the pathology as in typhoid fever. If not the very presence of the specific organism in the alimentary tract, then at least its prosperity and the measure of its luxuriance is possible by reason of the absence of hydrochloric acid from the gastric secretions.

It has been abundantly demonstrated that typhoid fever bacilli develop slowly and with difficulty in the products of more or less normal digestion. Perhaps with normal digestion as the bar typhoid fever germs could never gain a foothold, though they be daily ingested in large numbers. Be this as it may the rapid multiplication and proliferation of the bacilli in any implantation and the absorption in enormous quantities of toxic products is always favored by an unsanitary condition of the alimentary canal, which foul condition results from a discord in the complementary relations of the several digestive secretions plus the accumulation in the canal of undigested materials.

The first step in the fouling of the alimentary canal and the formation of conditions which make for severity in the type of the fever, is the loss of hydrochloric acid from the gastric secretion.

The febrile movements by which we judge of the severity of any case and upon which we base our solicitude for the probable issue are mainly the expression of two factors, namely, bacilli with their toxins circulating in the system and toxic products resulting from the melting down of tissues of the body. The latter are well named "the toxins of starvation," being expressive of destructive metabolism beyond the power of the emunctories to carry off the resulting debris and representing the outer and most exhaustive of the morbid forces making for fatality.

In the problem of treatment, whatever the measures employed, the indication is twofold—we must restrain bacterial activity at the seat of implantation and conserve every atom possible of the patient's strength. It is the crowning glory of the present-day treatment of typhoid fever that we aim to gain each of these in the highest degree possible with the minimum of detriment to the other. It was the light regard for the safety of the host—as in the old empiric treatment shot and shell were aimed at his fever—that mars the records of results received from the old plan of treatment.

Specific treatment for typhoid fever is to be hoped for in the

near future, for it will be of great value, particularly if it yields better results than are at present possible.

Coming now to the question of how and when to employ hydrochloric acid let me explain that it is my uniform practice to use the acid in every case just as soon as the alimentary tract has been well prepared for systematic feeding by the use of eliminatives, preferably broken doses of calomel followed by a saline or castor oil. I give the acid well diluted in doses ranging from two to fifteen minims, according to age and the needs of the individual case, three or four times a day. Pepsin may be added where it seems especially indicated, particularly in the very young or very delicate, and the mixture may be made especially palatable by giving it the form of an artificial gastric juice. This is the ideal mixture for pediatric use.

The treatment calls for water both for pleasant administration of the acid and to satisfy the thirst it tends to excite. This in itself is a noteworthy advantage in the treatment of this particular febrile condition in which patients almost never, without special and constant urging, imbibe enough water.

But the greater value of the acid lies in its effect upon gastric digestion and the tone of the digestive processes generally. This cannot be covered by a single statement. The function of the liver is dependent upon the presence of hydrochloric acid in the products of gastric digestion and the intestinal flora, now known to play an inestimable part in normal intestinal activity, is held to its normal by the reaction of the several digestive secretions one upon the other.

The French enthusiast and his counterpart in our country are at the present time at the point of declaring the lactic acid ferment the long sought for and elusive "elixir of life," by reason of its restraining effect on a too luxuriant intestinal flora. The result, as demonstrated by Metchnikoff, is the use of sour milk instead of sweet in this fever; but whether the milk acid acts favorably in the absence of hydrochloric acid from the gastric juice is a problem still unsolved. That the administration of hydrochloric acid in typhoid fever does restrain the prolixity of the specific bacilli of typhoid in the intestinal canal is certain. Furthermore, in the light of the science of dietetics pertaining to typhoid fever the ferments of sweet milk and of egg albumen are superior to any quality or property of milk gained by fermentation. Particularly in low states of the fever and in patients with

frail constitutions would I be reluctant to substitute sour milk for sweet milk, albumen water and broths. During convalescence I concede that the so-called "lacteal champagne" approaches the ideal for some adult patients.

Not a long time ago many physicians claimed to get abortive effects from the prolonged use of local intestinal antiseptics. To-day we know that the best intestinal antisepsis that is possible and the form that is of the greatest utility in the treatment of typhoid fever is secured by the proper use of calomel and by aiding digestion with hydrochloric acid. When there is constipation I give daily rectal irrigations. Any inclination to flatulency is promptly met with aperients as indicative of undue accumulation of the residue of imperfect digestion.

In conclusion let me observe that one of the greatest dangers of the day in the treatment of typhoid fever is that of centering attention too much on feeding and thus neglecting digestion and the sanitation of the alimentary canal. This is evidenced by the packed small intestines or rectum so generally observed in post-mortem examinations.

582 Federal Street.

IDIOPATHIC ACIDOSIS IN CHILDREN.—J. G. Sharp (*British Journal of Children's Diseases*, October, 1910). Author uses the term idiopathic acidosis because in the cases described he could find no anterior condition to account for the acidosis. On entering the room of a patient suffering from idiopathic acidosis, one is impressed by the peculiar sweet odor of the breath. The patient is often in a drowsy or semi-comatose condition, but rouses up when attacks of vomiting come on. Vomiting is a prominent symptom, the patient is not able to keep anything at all in the stomach. Headache and thirst are complained of. Respirations are frequent and there is loss of appetite. As a rule, the temperature is not high at first, but in the latest stages of the condition the temperature may reach 103°F. The bowels are constipated, the urine is scanty, but always contains acetone and often diacetic acid. No sugar is present in the urine. In mild cases the symptoms pass off in twenty-four to forty-eight hours. Idiopathic acidosis is only to be diagnosed when, after a searching examination, no cause can be assigned for the acid intoxication. Fatal cases of acidosis appear to terminate in from a week to eight or nine days.—*Archives of Diagnosis*.

SOCIETY REPORTS.

THE NEW ENGLAND PEDIATRIC SOCIETY.

The thirteenth meeting of the New England Pediatric Society was held January 28, 1911, at the Boston Medical Library.

JOHN LOVETT MORSE, M.D., PRESIDENT.

ADDRESS OF THE PRESIDENT.

It seemed to me that it would be of interest at the beginning of this, the fourth year of the New England Pediatric Society, to review rapidly the past history of the Society and to plan a little as to the immediate future. The Society was founded January 4, 1908. The original members numbered between 40 and 50. The membership at the end of the first year was 93, at the end of the second year 109 and at the end of the third year 122. This number is large enough to make a flourishing Society. It would be better, however, if we had twice this number. We can easily have it, if the individual members will aid the officers in getting new members. In the past this matter has been left almost entirely to the officers, who have done yeomen service. If every member would get to work and bring in at least one new member, the size of the Society would quickly be doubled. Personal solicitation is very important in this connection, as nobody ever pays any attention to a general invitation. It would seem as if there was a large field for this Society in New England, because the subject of Pediatrics is one which should interest him almost as much as it does the specialist, since a large part of every general practitioner's work is among children.

The average attendance in 1909 was 36, or 33 per cent. of the membership, while in 1910 it was 36, or 29.2 per cent. of the membership. The smallest number at a meeting last year was 23, the largest 50. This is not a bad average. It ought to be better, however, when the standard of the meetings is taken into consideration. This standard is very high, fully up to that of the meetings of the national societies. There has been no meeting since the foundation of the Society which it would not have been profitable for everyone, whether a specialist or not, to attend.

The standard of the meetings, is, as I have already said, very

high. It is not so high, however, but that it can be improved. It would be hard, nevertheless, to raise the standard of the papers, as they are already so good. There are certain suggestions, however, regarding the papers which I think would improve them. One of these is that a short paper is always more interesting and instructive than a long one. There are often many details which should be published, but which are tiresome and are better omitted when a paper is presented to the Society. Another suggestion is that papers are always more impressive and more interesting when they are spoken than when they are read. This method of presentation is, of course, harder than the reading of a paper, but the gain in interest is well worth the additional trouble. It is always well to remember that the details of cases, and especially pathologic details, are always tiresome and usually unnecessary, and that they can be printed and read later at leisure. It is impossible, also, for a listener to grasp long series of figures or statistics. They should be presented in the form of tables or only the main points given.

The discussions have not been free enough in the past. The members have apparently been afraid to talk freely for fear that they would hurt somebody's feelings if they disagreed with them. This seems to me to be entirely wrong. As competition is the life of trade, so free discussion is the life of a medical meeting. Everyone ought to be man enough not to be offended when someone disagrees with him in a medical meeting and not to carry away any ill feeling.

It has seemed to me that rather too much time has been given in the past to the reading of papers and too little to the presentation of patients, pathologic specimens and short case reports. I feel sure that all of these matters would be of interest and add variety to the meetings.

It would be a great help to the officers if the members would volunteer to present papers, patients or specimens, and not leave it entirely to the officers to drum them up.

The constitution says that three or more meetings shall be held annually. Four meetings have been held in each of the last two years. I hope that it will be possible to hold more than this during the coming year. Whether it will be possible or not depends of course on you, that is, on whether you are willing to provide the material for the meetings. With your assistance we can have more meetings and better meetings. Without it we cannot.

DR. E. A. CROCKETT, of Boston, read a paper entitled, "When Shall We Remove Tonsils and What Type of Operation Shall We Do?"

Enucleation of the tonsil is an operation with considerable risk and in unskilled hands will show a higher mortality than an abdominal operation for an interval appendix in the hands of a good surgeon. Dr. Crockett then drew attention to the fact that there have been twelve deaths in this city and its suburbs in the last two years, following the removal of tonsils. He, therefore, urges that this operation should only be performed by the skilled surgeon. Operation should not be performed without due deliberation and definite indications. "During the operation remember the surgical landmarks of the throat. Remove the tonsil by careful blunt dissection and having operated treat the patient as a serious case for the next three or four days. Do not operate unless you are able to meet all the necessary emergencies which every surgeon must expect to have occasionally. If these rules are observed the operation will be undertaken with a minimum of bad results and a maximum of success from the standpoint of the patient and will not be so generally performed as at present.

DR. GREENE.—I think Dr. Crockett's very interesting paper is worthy of commendation in many respects. There are a few points which it seems to me should be emphasized and the chief one of them is the consideration of the shock and liability to hemorrhage from the operation of enucleation in adults as a reason why the radical method should be undertaken, in adults especially, with due deliberation and care. I feel perhaps a little more strongly than does Dr. Crockett about the importance of complete enucleation. The reason why the radical enucleation operation has come into vogue is that the results of partial operations in the past have been unsatisfactory, leading to a recurrence of the symptoms for which operation was done and frequently making a second operation necessary.

If one examines a large series of cases in which partial operation has been done and compares this with a series where complete operation has been done, the end results will be found to be strikingly in favor of the latter. The last word in the matter of technic of tonsil operations has not yet been said. The ideal type of operation in my opinion would be the most complete operation with the minimum of shock and hemorrhage.

DR. ROTCH.—I wish to especially draw attention to the importance of operating upon enlarged tonsils and adenoids where they are evidently a cause of delayed development, especially of the thorax, but also when affecting the general condition of the child.

DR. LANE.—I remember that once when the Director of Hygiene in the schools of a neighboring large municipality came out to Milton to speak before a society which was interested in the welfare of the schools there, he asked me if there was anything I would like particularly to have him speak about, and I suggested adenoids and tonsils. In the society were parents who had gone to their physicians for advice regarding the removal of tonsils and presumably adenoids in their children, and I am sorry to say that the director brought up the subject only to speak of the influence which fresh air and sunlight had upon the growths and tonsils and as opposed to operation, which to my mind was distinctly detrimental to the health of the children.

The specialist has to rely somewhat for the previous history upon the general practitioner who has seen the child with repeated attacks of tonsillitis, although at the present time the tonsils may be normal and there are apparently no indications for removal.

DR. GOLDTHWAIT.—It has been my good fortune to see a good many tonsils removed in cases with rheumatoid joint conditions, and one thing which has impressed me is that if the tonsils are to be removed with the idea of removing the source of infection they should be very carefully enucleated. I have seen several cases in which the tonsils were supposed to have been removed where there was enough of the substance remaining to make subsequent operation necessary. In cases in which the patients have not had much quinsy and many local signs of inflammation, accumulations of pus have been found which have been a very striking and a very distinctive feature in the joint conditions. It seems to me, and it has come to be my advice in speaking to patients about these conditions, that if the operation is to be performed for the removal of the tonsils to eradicate a means of infection, it should be a complete enucleation.

DR. MORSE.—There are just one or two words that I want to say on the subject. I do not believe that the tonsils are the root of all evil, but do think that a good many things come from the

tonsils, and to those which have been mentioned I would add nephritis as a sequela of tonsillitis. In young children enlarged tonsils often interfere so much with deglutition that they take their food very poorly and have their nutrition very much disturbed on this account. There is one question which is often asked me which I wish Dr. Crockett would answer: If a young child's tonsils are removed will it interfere with the development of a proper singing voice in after years?

DR. EASTMAN.—I have seen 2 cases in the past year in which the tonsils were removed, in both instances the removal effected with the tonsillotome, and several months later as a result of this method there was an infection resulting in glands in the neck. I cannot see any objection for complete removal of the tonsils even in a child.

DR. CROCKETT (closing).—I think that in reading a short paper on a long subject one's position is likely to be misunderstood. There are many cases which present no history pointing to the tonsils. The class of cases which present a rheumatic history, a history of tuberculous glands, a history of repeated obstruction, diseases of malnutrition caused by insufficient breathing space, those are indications for removal, those cases all need enucleation. In very many cases removal of the adenoids is sufficient, and if I saw a case with large adenoids and small tonsils I would prefer to remove the adenoids and do my enucleation at a second operation if necessary, but in cases which present a clear history of infection from the tonsils, remove all that there is and do not leave any at all. Enucleation is a big operation and should not be attempted in a suburban town away from one who is competent to do it. If the general practitioner wishes to do an enucleation then let him get his patient near to the specialist, make all the necessary preparations and be prepared to meet the hemorrhage if it occurs. This is what one must always be prepared for. You can see it right down at the Eye and Ear Infirmary every day. I have been connected with the infirmary for twenty-one years, and I suppose we do 600 or 700 operations a year. Up to the year 1906-1907 I do not remember a single case of hemorrhage. Now I never finish a three months' service without seven or eight hemorrhages, and they are bad hemorrhages; they are fully as bad as an obstetrical hemorrhage, and if you do not go down and do something pretty quick you will find a funeral

when you get there. Now this is the point which I particularly wish to make. It is a form of operation which should not be entered into lightly, and one which should not be done twenty-five miles out of town. It is a hospital operation and a serious one, and if it is done with care by the proper man it is all right. I do not mean to say that the specialist is the only one who can do the operation, but I do not think that the medical man is the man fitted to do it; it is a critical operation and it is not applicable in all cases of tonsil hypertrophy.

As to the effect on defective speech after removing the tonsils it has been my experience that, in cases of stammering, the condition is a mental one. It is a habit and is better treated by the nerve department and I should think that operation would absolutely fail to improve it. The thick speech which tonsils and adenoids produce would be helped by removing the adenoids. Dr. Jelly has brought me quite a number of children from his class of backward children in the public schools and in all cases, almost without exception, the difficulty was a nervous or mental thing and not at all referable to the condition of their throats, and another thing to be considered is that children imitate very readily.

I think that removal of the tonsils even in the singer's voice will probably improve the voice, but it will disturb the method, which is an important matter if the voice has already got its training, but the removal of tonsils in young children will improve the conditions and not do any harm at all. In rheumatism with an endocarditis I would not hesitate at all to do an enucleation. I would not remove the tonsils in the acute attack, that is, in the height of the rheumatic process with temperature and acute infection. I have seen it done a number of times, but my own feeling is that it always increases the septic process and the child is sick longer than usual. In the same way in a patient with glands in the neck I would rather delay the operation until after the acute process is over.

DR. JOEL E. GOLDTHWAIT, of Boston, presented the following paper: "What Is to Be the Attitude of the Pediatricist and the Orthopedist in the Treatment of the Child with Congenital Ptosis of the Abdominal Viscera?" He said that anatomists have shown that one out of every five persons has a long mesentery to the transverse colon, which allows a congenital ptosis of the same.

This caused the person to take characteristic positions and resulted in impaired nutrition. A series of Roentgen ray plates were shown which illustrated this condition. He then told how mechanical support could overcome ptosis.

DR. TALBOT.—The plates which Dr. Goldthwait has shown us are very interesting and instructive. I have seen one or two such children, and I have an X-ray plate similar to the ones just shown of a boy whose only complaint has been constipation. This boy had a ptosis of the transverse colon with a kink about half way up the descending colon. The ascending colon must have had a long mesentery because it was doubled up. A series of purgatives were tried without improvement. He was then put to bed with the same result. His stools were examined for the different food components (meat, starch and fat), and it was found that his digestion was normal. He was, therefore, given his caloric needs in foods which left the smallest fecal residue, that is, meats, sugars, fats and eggs. His abdomen came down about six inches in about two weeks. The whole clinical picture was a boy who was uncomfortable when he came in, having persistent constipation, and on going out he was a comfortable youngster who did not look particularly abnormal. Unfortunately, we did not get an X-ray to see what happened after he got a smaller food residue than previously. I think that treatment from the point of view of diet is equally important as the mechanical treatment.

DR. CRAIGIN.—The point in diet which Dr. Talbot brought out interests me. Some of the men who have been treating these cases advocate the use of bulky foods to clear out the large intestine. I recall many young children of this anatomical type who had been fed largely on crackers, bread, potato and cereals. They improved immensely on cutting down the bulky foods and giving eggs, meat, fat and sugar.

I would like the opinion of others on the use of bulky foods. Is it not liable to aggravate the faulty mechanical condition?

DR. GREENE.—I would like to ask if this type of ptosis can be present without causing any symptoms in the child, or whether this form always causes symptoms; can the child be a perfectly healthy one and yet have the conditions?

DR. RICHARD M. SMITH read a paper entitled "Silver Nitrate Irrigations in the Treatment of Infectious Diarrhea in Infants."

He said that a solution of 3 per cent. silver nitrate had been used at the Boston Floating Hospital last summer in treating both the acute and chronic cases of infectious diarrhea. One pint of the solution was injected after the colon had been cleansed with a sterile water irrigation. In some of the cases an early injection apparently hastens the disappearance of blood from the stools and shortens the course of the disease. In some later cases where blood and pus persist in the movements the ulcers can be stimulated to healing by the silver nitrate injections. Since no harm has followed the use of silver nitrate injections and benefit has been received it would seem worth while to give this means of treatment a further trial.

DR. ROTCH.—This work, which has been done at the Floating Hospital, as reported by Dr. Smith, is extremely good and should induce physicians to make trial of it during the coming summer. It will probably be especially valuable in the more chronic forms of cases where actual lesions are present. This special means of treating cases of infectious diarrhea will, I hope, prove to be a most effective part of the general specific treatment which has lately been evolved in the bacteriologic study of these cases. By what is called infectious diarrhea we understand a condition which is produced by organisms which penetrate the tissues. In this class of diarrhea, therefore, we have to deal not only with disturbances which are produced within the intestine but also outside of the intestines in the tissues. We also have to deal with local irritation of the bacilli within the intestine and a production of toxins; also with the effects produced by the absorption of these toxins and the destruction of proteid material in the tissues, thus interfering with normal metabolism. It seems probable that the character of the infecting organisms in respect to their work upon the proteids in the intestine may be changed by the giving of carbohydrate food, and in this way lessening the production of toxins. For this purpose lactose can be given by the mouth, following the local treatment with laxatives and irrigations. It has also been proposed to give infusions of dextrose in order to restore to the blood the sugar which has been used up by the body during the starvation treatment, as the most available form of energy. Considering how meager and inadequate our treatment of these cases has been in the past I think that it is encouraging to at least feel that we in the near future may have three forms of

specific treatment, by the mouth, by the rectum, and by the infusion of dextrose.

DR. BOWDITCH.—I am very glad to hear what Dr. Smith has to say about this treatment and think this procedure an excellent one. There is one thing I would like to have him tell us, and that is whether any postmortem examinations were held on these patients which allowed him to see how far the silver nitrate penetrated. Another question is, What was the amount of the irrigation that he used? My own feeling is that the chronic cases are the ones which are more greatly relieved. I have seen one or two cases in which, after ten days' duration, with a certain amount of prolapse, one injection of silver nitrate, of about 8 ounces, was sufficient to stop all subsequent mucus, bloody movements and make them perfectly normal. If we can help a child in that way it means a good deal to the further rapid convalescence of the case.

DR. PRAINO.—I would like to ask if Dr. Smith has ever used argyrol in this connection? I have tried a 5 per cent. solution in a few cases and the results obtained were almost miraculous.

DR. MORSE.—I have not used this silver nitrate irrigation in any of the acute cases of diarrhea, but have in a small number of chronic ones, and my feeling is that most of them have been helped to a greater or less extent, some of them a good deal. I certainly have been favorably enough impressed with the results that I feel that next summer this is one of the things I shall try more regularly than in the past.

DR. JORDAN.—I was very glad indeed to listen to Dr. Smith's paper, as this subject is of interest to me. I have seen a good many of these diarrheas in the last two years, and the use of silver nitrate solution in the bowels is something that I would not myself have tried without first hearing the reports that I hear tonight. Dr. Bowditch just spoke of something which I wish to touch on also. We do not know just how far the silver nitrate is going to penetrate or what harm it is going to do. To illustrate this point I will cite the case of a man who was coming to my office for treatment of a finger, and as it was not healing quite fast enough, I tried the 5 per cent. silver nitrate solution to stimulate fresh growth, telling him to return the next day. He did so, and I was surprised to find that the previously healthy granula-

tions had all broken down and I had a very large ulcer there, so I wonder if the nitrate of silver may not do the same thing to the colon.

DR. LANE.—I would like to speak of the use of the silver nitrate solution in 2 cases of infectious diarrhea, which we formerly called dysentery, and is characterized by tenesmus and mucus, pus and blood in the stools, that occurred in my practice last spring shortly after Dr. Hewes' report of his results with a 5 per cent. solution. In these 2 cases in which I used it early, before the fourth day of the disease, the bacteriological examination later disclosed the proteus bacillus as the infecting organism. One child, three years old, had twenty-one stools in one day, after which I tried the 5 per cent. solution of silver nitrate, 8 ounces, injecting it high after cleansing with warm water. There was no evidence of pain, but she did not retain even the 8 ounces, as a part, perhaps 2 ounces, was immediately expelled. Afterwards the characteristic appearance of the stools was such as Dr. Smith has described, with the exception that the number was increased; there were twenty-four in the next twenty-four hours, odor was foul and the tenesmus more severe. As there was no improvement after forty-eight hours I did not feel that one application was a fair trial, I repeated the irrigation with the same results. The other case showed a similar lack of improvement under the silver nitrate irrigations and I was satisfied that the treatment did no good. I should hesitate to use it again.

DR. SMITH (closing).—As to the question of postmortem findings in the cases to which I referred which proved fatal, we were unable to get autopsies, so I do not know how far up the colon the silver nitrate penetrated. I am sure that none of the patients on the Floating Hospital were in any way harmed by the treatment. None of them seemed to be worse after its use. The cases which Dr. Lane has referred to are of value in a discussion of this sort. It is one of the points I tried to bring out, that since no harm is done by this treatment, it is perfectly fair to try it in a greater number of cases of summer diarrhea, for we stand a reasonable chance of quickly relieving the condition. I have not tried argyrol in any of the cases. I have seen a favorable report of its use by someone else. Dr. Bowditch asked about the amount of the irrigating fluid. In all cases we used a pint of silver nitrate solution following a preliminary cleansing irrigation.

THE PHILADELPHIA PEDIATRIC SOCIETY.

February 14, 1911.

J. TORRANCE RUGH, M.D., PRESIDENT.

BACILLUS COLI INFECTION OF THE URINARY TRACT.

DRS. CHARLES A. FIFE and GEORGE M. LAWS reported the case of a girl of six years, admitted to the Presbyterian Hospital September 9, 1910. Maternal grandmother, a maternal grand-aunt and three of her children probably had phthisis. Both parents undernourished. Home and personal hygiene good. Child never strong; three attacks of "cholera infantum"; at least one severe attack of enteritis or enterocolitis every year since. In all these attacks there was much pain in hypogastrium and lumbar regions. Urine at these times said to be foul and occasionally contained blood. In May, 1910, a similar attack; vomiting, numerous bloody, mucous liquid stools, pains in lower abdomen and back, foul urine, dysuria, little blood in urine. Though the acute symptoms lasted three weeks, the patient has been very languid since, not playing or talking much. In July she had another acute attack, with rigors, vomiting, diarrhea with blood and mucus, pain in lower abdomen, high fever and prostration. Symptoms subsided in two weeks but recurred in another week, again lasting two weeks. She became worse again when out of bed a few days. All symptoms were referable to the gastrointestinal tract with exception of the frequent and painful micturition and the foul-smelling urine. The urinary symptoms were overlooked by the family and medical attendants, typhoid fever being suspected. Eighteen months before admission to the hospital she had an alveolar abscess involving the antrum; this drained for about four months, associated with nervous symptoms suggesting chorea. The nature of the infection was not determined. No history of other infectious diseases. On admission child was evidently toxic; markedly emaciated; pallor decided but of a muddy hue; apathetic, lying quietly curled on one side, without speaking or paying any attention to surroundings. There was no paralysis, but she only ate or drank after great persuasion. No adenopathy; heart and

lungs and liver negative; spleen and kidneys not palpable; two skiagrams of kidney region negative; abdomen slightly distended; no vulvovaginitis; joints normal, reflexes sluggish. Temperature very irregular, ranging from $97\frac{3}{8}^{\circ}$ to $102\frac{1}{2}^{\circ}$ F.; pulse corresponding, from 80 to 140, and respirations from 20 to 30. No vomiting; no rigors; stools soft, only two or three daily, some mucus, trace of blood in first stool only; no ova; no parasites. Incontinence of urine; amount of urine apparently normal, quite cloudy, purulent odor, strongly acid, specific gravity 1.005, trace of albumin, no sugar, no casts, many pus cells. Hemoglobin 70 per cent.; leukocytes 15,200; Widal negative. There was little improvement during three months upon bland diet and urinary antiseptics. The temperature would subside for a few days, the child becoming less apathetic; would take nourishment more readily; exercised control of bowels and bladder; gave no evidence of pain; voluntary movements slightly incoördinate, suggesting chorea. Eight times in this period, however, there were decided exacerbations; temperature would go to 103° or 104° F.; apathy increased; anorexia became marked; abdomen became distended, not especially tender, though on one or two occasions there was tenderness over the left kidney region; no diarrhea but movements became soft and contained mucus. Urine became more foul and contained more pus. The amount was apparently not affected but exact measurement was impossible. During these three months the urine was examined every third or fourth day, was constantly acid and always contained many pus cells and motile bacteria, with an increase in number at the time of the acute attacks. Pure cultures of bacillus coli were obtained from the urine. Urine, stools and sputum showed no tubercle bacilli. The blood was examined seven times, hemoglobin ranging from 65 per cent. to 80 per cent., red cells about 5,000,000, leukocytes from 9,500 to 18,000. Differential count was polymorphonuclear 57 per cent.; lymphocytes 30 per cent.; large mononuclear 8 per cent.; transitional 1 per cent.; eosinophiles 4 per cent. Agglutination test for typhoid and paratyphoid negative. Blood cultures negative. Von Pirquet tuberculin test negative. On December 13th, after the temperature had been between 100° and 104° F. for ten days, and all the constitutional and local symptoms had been at their worst, an autogenous vaccine containing 50,000,000 bacteria, prepared by Dr. D. B. Pfeiffer, clinical pathologist to the hospital, was

injected. Constitutional symptoms were immediately alleviated and the next day the temperature was normal. December 16th, 100,000,000, December 19th, 150,000,000, December 22d, 200,000,000, and December 25th, 250,000,000 bacteria were injected. During this period the temperature remained normal and the general condition improved greatly; immediately after the vaccination of December 25th the temperature rose to 102° F. and the child became listless. December 28th, though the temperature was subnormal, 300,000,000 bacteria were injected, unwisely. Marked constitutional reaction immediately followed, with return of all symptoms except lumbar and hypogastric pains. The temperature became normal January 9th, and on the 13th 100,000,000 bacteria were injected. Since then she has had four injections of 100,000,000 bacteria each. She has been free from local or constitutional symptoms and the general health has been marvellously improved. She now runs about, plays, eats well, is losing her choreiform movements and is gaining weight rapidly. Hemoglobin is still 70 per cent. The urine still contains many pus cells and bacteria and gives pure cultures of bacillus coli. The above, with the cystoscopic examination by Dr. Laws, which follows, justifies the diagnosis of chronic ureterocystitis with pyelitis and probably pyelonephritis due to bacillus coli infection. The infection was probably an ascending one.

DR. G. M. LAWS reported that cystoscopic examination revealed a moderate degree of cystitis involving the trigone. The ureteral orifices were markedly dilated and did not contract. The ureters themselves were dilated and infiltrated so that their intravesical portions were distinctly outlined. Flakes of pus were exuding from the left ureter. Ten cubic centimeters of a four-tenths per cent. solution of indigo-carmin were injected intramuscularly. The color appeared at the end of eighteen minutes on the left side and twenty-one minutes on the right, indicating involvement of the parenchyma of the kidneys as well as their pelvis. The condition of the ureters is a noteworthy feature of the case since, in an adult, in the absence of urethral obstruction, it would be regarded as strongly suggestive of tuberculosis. Kopsammar has recently stated that dilatation and thickening of the ureter occurs in association with pyelitis when the lesion is due to an ascending infection. A survey of the literature on bacillus coli infections of the urinary tract in childhood discloses a num-

ber of autopsy records, in a large percentage of which a similar condition of the ureters is mentioned. These observations are, therefore, additional evidence in support of the theory that pyelitis is secondary to cystitis in the type of infection under consideration.

DR. J. F. SINCLAIR said that Dr. Jopson and he had reported a somewhat similar case recently, sent in with the diagnosis of appendicitis. Rigors in pyelitis are of importance in making the diagnosis, since chills are uncommon in childhood.

DR. D. J. M. MILLER said that infections of the urinary tract must be a great deal commoner than the profession believes. Within two years he has seen 3 cases of mild urinary infection in private practice. He referred to Friedenwald's recent article;* he had found girls no more frequently affected than boys. One of his cases, in a boy, followed otitis; another followed measles, and the last colitis, the two last in girls. It is the most common cause of unexplained fever in children, next to otitis media, and should always be borne in mind.

DR. FIFE said that the condition was probably much more common than is generally believed. He thought that Goppert found evidence of colon infection of the urinary tract in about 1 per cent. of all cases in his clinic. Many observers give a higher percentage of infection in girls than Friedenwald's (72½ per cent.); of Abt's 22 cases, 21 (95.5 per cent.) were females; of Escherich's 11 cases 100 per cent. were female; of Box's 19 consecutive cases only 1 was male, and Goppert found 89 per cent. of his cases female. The infection probably ascends through the urethra most commonly, but it may descend in the blood stream. Direct infection may occur from the colon to the bladder, but only when the mucous membranes of both colon and bladder are abnormal. Most cases occur before the age of four years. In this girl, now six years old, the infection may date from infancy.

INFANTILE HEMIPLEGIA.

DR. JOHN F. SINCLAIR showed a colored boy, four and one-half years old, who had been breast-fed three years, though condensed milk had also been given after the third month and table food after the second year. The history was vague, as the mother

* ARCHIVES OF PEDIATRICS, November, 1910.

could not be reached; there was no reason to suspect syphilis. The child had never been sick, though he had had some attacks of diarrhea, whenever he got a tooth. He talked and walked when other children do. He had not had any convulsions. At three years, trembling of the right side was first noted, with loss of power in the right arm and leg and gradually he lost the power of speech. This condition has gradually grown worse; now he has difficulty in walking, standing, talking and cannot hold things in his right hand. There never was any pain. Dr. Langdon reports no abnormal condition of the eyes. The right upper extremity shows constant athetoid movements; incoördination prevents all useful movements. Wrist and forearm are flexed, though not rigidly; power is much reduced. There is no deformity and no atrophy; knee-jerk is exaggerated, as is the Achilles jerk. He probably presents a postnatal cerebral lesion, involving probably the left internal capsule, including the speech fibers from Broca's area. From its insidious onset without convulsions the lesion was probably a thrombus. While his speech may improve with training, the athetosis, spasticity and motor weakness are unlikely to improve much. The absence of convulsions and the persistence of some speech are favorable indications for the mental outlook.

DR. H. M. LANGDON said that examination of the eyes of this patient showed nothing that could help in diagnosis. The absence of changes in the ocular structures was decidedly against the presence of any cerebral neoplasm. Vision is normal and the pupils react well; no fundus changes are visible. Yet Dr. Spiller has reported 2 cases of slowly occurring hemiplegia as a sign of brain tumor, without any fundus changes at all. Dr. C. S. Potts has also reported such a case, Dr. Langdon having made the ocular examination two weeks before the patient's death.

DR. A. H. WOODS said these cases present great interest, especially in prognosis. There can be no question as to the cerebral hemiplegia, since tremor, weakness, athetosis are marked and aphasia has developed after speech was established. There is some rigidity and spasticity, with distinctly increased knee-jerk on the affected side. It is, therefore, a postnatal hemiplegia. But the cause is not easy to assign. Arterial disease antedating birth may be the determining factor in a natal or postnatal lesion. It is conceivable that a very slow-growing tumor might be present,

but this need hardly be considered here. Dr. Woods believes that there is a vascular lesion, probably hemorrhage, embolism or thrombus, with softening following. The gradual spread of this area would account for the slight increase in symptoms. Autopsy would show a cyst or scar with surrounding sclerosis. The boy, with proper teaching, should again learn to talk.

DR. J. T. RUGH added that an older brother of his was suddenly attacked by hemiplegia at the age of three years. For six years he had absolute aphasia; at the age of nine he spoke, and at eleven he began to walk. He has been a practicing physician for twenty-six years, is quite well and is now fifty years old. His complete recovery has been remarkable. Thus the prognosis of infantile hemiplegia is not always grave.

In answer to Dr. Hammond's question whether decompression ought not to be attempted in this case, Dr. Sinclair said that symptoms had not progressed so decidedly that operation seemed indicated. He believes the condition to be the result of an old lesion. Proper individual attention should now bring about great improvement.

CONGENITAL PYLORIC STENOSIS.

DR. H. A. SUTTON, by invitation, reported the case of an infant of six weeks, in whom symptoms of pyloric stenosis had existed two weeks, when operation was successfully performed.

DR. L. J. HAMMOND said the etiology, which at present is largely confined to a theoretic discussion, is most interesting. The most logical theory would seem to be that which involves a consideration of those factors entering into faulty embryologic development. The pylorus varies widely both in shape and structure, from the usual ring-shaped constricting band formed by a reduplication of the gastric mucosa through which circular muscular fibers are found in varying amounts and development; it may be oval or formed by two crescentic bands, one above, the other below the orifice, or it may consist of but a single crescentic fold. This inconstancy of formation would suggest the possibility of a vice in its development when there was added such an error in development as an unusually high position of the pyloric end of the stomach, producing angulation and thus excessive connective tissue hyperplasia in those cases where the pylorus consisted of a single fold, or twisting of the longitudinal fibers might be re-

sponsible for reversion in their growth and development. Whatever the determining factor, faulty embryologic development seems the most ready explanation. The condition is often associated with other developmental defects, also.

DR. C. H. WEBER said that he had seen the patient several times before operation. The presence of the loud systolic murmur and an enlarged liver, associated with vomiting, made the diagnosis uncertain; but later visible peristalsis was elicited, the vomiting became projectile and the diagnosis was readily made. The presence of the congenital heart lesion could possibly be considered a point in favor of the theory of congenital origin of the hypertrophy. Dr. Weber thought that in spite of the good results obtained by medical treatment, especially as reported in the English statistics, the tendency would be toward surgical intervention. Many cases of recovery after operation are being reported and no doubt results will continue favorable in early cases. Medical treatment requires very careful dietetic care, and is a long, tedious process, possibly lasting for months. Dr. Weber said that he referred only to the type of cases having the anatomic conditions which were found in the patient under discussion.

DR. J. P. CROZER GRIFFITH urged the importance of giving medical treatment a fair trial. There were cases such as the one reported this evening and another recently shown this Society by Dr. Lowenburg, which Dr. Griffith had also had the opportunity of seeing in consultation, where there was no doubt about the advisability of operating. There were many other cases, however, where the question of operating was a most difficult one to decide. Within a few months he had been called to see a child in whom symptoms were typical; a few days later he was asked to come hurriedly, with a surgeon, for operation. It was found that a very small amount of fecal matter had appeared in the stools and it was decided to wait twenty-four hours. The child is now entirely well without operation. Admitting that hypertrophic stenosis is congenital and the infant remains perfectly healthy for several weeks, suddenly showing symptoms of stenosis, it is evident that something more than the hypertrophy must be present to account for the condition. It is clear that we have, in addition to the hypertrophic stenosis, or perhaps existing entirely without it, a condition of pyloric spasm, and in some cases also of swelling of the mucous membrane. It is

probable that in nearly every case of hypertrophic stenosis a certain element of spasm is present, and it must be true, from the large number of cases which have recovered without operation, that in a great many spasm exists alone, or if there be any hypertrophy it is of a degree which by itself does not produce symptoms. Dr. Griffith believes that symptoms supposed to describe each variety of case cannot be depended upon, and the question of operation often becomes puzzling. In view of the high mortality which has attended the operations recommended for this disease, one must hesitate before advising any one of them; while it is equally serious to delay operating so long that the strength of the infant is weakened to an extent which removes most chance for recovery after operation.

DR. HARRY LOWENBURG said that the whole question was one of diagnosis, the treatment being almost invariably surgical once the diagnosis was made. Most cases die because they are treated as marasmus, the profession being insufficiently informed as to the frequency and symptomatology of the condition. All cases of persistent vomiting associated with wasting should be regarded as pyloric stenosis until it can be proved that they are not. It is not safe to temporize long. Dr. Lowenburg believes that no case of true hypertrophic pyloric stenosis ever recovered without operation. The infant should be placed in the best possible surroundings and great care exercised in preparing its food; if, in spite of this, it loses weight daily, operation should not be delayed. If weight and strength remain stationary, or it gain ever so little, we can afford to wait. When a pyloric tumor can be palpated operation is indicated at once. The inability to palpate a tumor is often due to rigidity of the abdominal muscles from crying or straining. Dr. Lowenburg could overcome this by a few whiffs of chloroform, just enough to still the infant; he recommends this as a routine procedure in these cases.

DR. MILLER said that he had seen 5 or 6 cases of so-called hypertrophic pyloric stenosis treated by careful dietetics and lavage with recovery. In every case the principal cause of the symptoms is spasm; in some it is pure spasm; in others, spasm plus some hypertrophy of the muscular fibers of the pylorus; and in others absolute occlusion of the pylorus, due to true hypertrophy. To decide when to operate is the great difficulty. Dr. Miller advises postponing the operation so long as the baby does not lose

in weight and continues to pass fecal matter by the bowel. Patient, persistent dietetic experimenting will do much for these cases. In the treatment he advises feeding only when the stomach is empty, to be determined by the passage of the tube—a quantity that can be retained without vomiting, not too much. The presence of reversed peristalsis is not a sign of pyloric stenosis alone; it may be present when no true stenosis exists, and the same may be said of projectile vomiting and other classic symptoms of the affection.

HEMORRHAGIC AND GANGRENOUS VARICELLA.

DR. FRANK CROZER KNOWLES read a paper reporting a fatal case of hemorrhagic varicella in a boy of two and one-half years. Only 6 somewhat analogous cases were found in the literature. He divided these cases into varicella with hemorrhagic lesions; varicella with a hemorrhagic and gangrenous exanthem; varicella associated with petechial eruption; varicella with hemorrhages from the kidneys, stomach, intestines; and gangrenous, non-hemorrhagic varicella. Under the latter heading were included cases of varicella gangrenosa. Dr. Knowles concluded that there is a true form of hemorrhagic varicella, starting with ordinary vesicles with clear contents which some hours later become filled with blood. It is a rare complication of varicella. The hemorrhagic vesicles may lead to the formation of gangrenous areas. The virulence of the infection and the resistance of the individual govern the hemorrhagic and gangrenous tendency. There is also a true form of varicella in which the contents of the vesicles become purulent and may lead to gangrenous areas, but usually to ecthyma or impetigo. The term varicella gangrenosa should be applied only to cases of gangrene directly caused by varicella. Dermatitis gangrenosa infantum should be applied to cases of gangrene in children, whether associated with varicella or not, if not directly dependent upon that condition. Twenty-eight references were given in the paper.

DR. MAURICE OSTHEIMER, who had also seen this case, spoke of the question of diagnosis. The history of recent chicken-pox in the family and the presence of typical vesicles, together with lesions in all stages of development, excluded small-pox. Dr. Ostheimer believed that the hemorrhagic variety of chicken-pox

was rare because the individuals who showed a hemorrhagic tendency were rare; that this idiosyncrasy explained the occurrence of hemorrhagic varicella better than a very virulent infection or a poor general condition of health. This child was one of a family, all brought up under the same conditions, and apparently as strong as the others. Yet he had hemorrhagic varicella and died; while the rest only had simple chicken-pox. He agreed with Dr. Knowles that the gangrenous variety, whether it occurred with true varicella or not, should be separated from the hemorrhagic variety of varicella, a rare form of true varicella, and should be considered as a skin disease, while hemorrhagic chicken-pox remains an infectious disease. It should not be forgotten, either, that traumatism, during an attack of chicken-pox, may result in the occurrence of some hemorrhagic lesions.

DR. GRIFFITH said that he had the records of 2 cases of hemorrhagic varicella which must have been very similar to the case described by Dr. Knowles. In one the course was extremely rapid, with widespread purpura, death occurring before gangrenous changes could take place. He had also seen 2 cases of varicella gangrenosa, one previously reported; in the other the germ present was found to be the bacillus pyocyaneus.

DR. A. E. ROUSSEL spoke of the similarity between hemorrhagic varicella and hemorrhagic variola. He has seen some lesions of varicella that became hemorrhagic from local traumatism and similar instances in small-pox also. He regretted that Dr. Knowles had not given a percentage of deaths in his cases. In small-pox, when hemorrhage occurs in individual pustules, recovery follows in only 10 per cent.; when petechiæ occur, death is almost sure to follow. Leukocytosis, generally present in small-pox, is most marked in the hemorrhagic cases, especially the purpuric type, showing an increase in the mononuclear cells with the occasional appearance of normoblasts.

DR. KNOWLES added that 1 of the 4 petechial cases died and 2 of the other 6 cases died. No leukocyte count or differential counts were made, because the case died three days after it was first seen. No family history of bleeding could be obtained. Therefore Dr. Knowles considers the virulency of the infection and the lack of resistance of the individual the causes of the varicella becoming hemorrhagic in this case.

BOOK REVIEWS.

THE INTERNATIONAL MEDICAL ANNUAL. A YEAR BOOK OF TREATMENT AND PRACTITIONERS' INDEX. By Many Contributors. Twenty-ninth year. New York: E. B. Treat & Co., Publishers, 1911.

This work again provokes the statement that it is one of the most useful volumes which can be found for the physician's library. It supplies him with what is new during the past year, and it reviews for him and brings up to date what is old. The man who has been using the "Annual" for years knows that he can use it with confidence, and does so use it, as both text-book and review. The usual plan has been followed in this volume of indicating the trend of medical advance in certain special articles, such as the one on Hormones, presenting a review of therapeutic progress and a dictionary of remedies where one can find the latest methods; and then a dictionary of treatment under the head of the various diseases. For the pediatricist there are articles of interest on Hirschsprung's Disease, on Infant Feeding, on Melena Neonatorum, Eczema, Cerebrospinal Meningitis, Infantile Paralysis, Pertussis, etc., and much to be gathered on the live topics of syphilis and "606."

The volume does great credit to the editorial board, who have surely undertaken their task with an unusually conscientious spirit.

MOTOSENSORY DEVELOPMENT. Observations on the First Three Years of a Child. By GEORGE V. N. DEARBORN, Professor of Physiology in the Tufts College Medical School, Boston. Pp. 215. Baltimore: Warwick & York, Inc., 1910.

This book will be of interest to psychologists, physicians and teachers of young children, as it is the record of the development of an actual child from birth.

WHAT SHALL I EAT? A Manual of Rational Feeding. By Dr. F. X. GOURAUD, Formerly Chief of the Laboratory of the Medical Faculty of Paris. Translated by Francis J. Rebman. Pp. 379. New York: Rebman Company, 1911.

This book will not be of much value for the physician, for it is not written with any great exactness, and there are other books whose facts and data are much more definite and readily

understood. Even for the layman it will be difficult reading. There are a number of typographical errors.

OBSTETRICAL NURSING FOR NURSES AND STUDENTS. By HENRY ENOS TULEY, A.M., M.D., Professor of Obstetrics, Medical Department University of Louisville; Visiting Obstetrician and Lecturer on Obstetrics to Training School for Nurses, John N. Norton Memorial Infirmary and Louisville City Hospital; Member Sloane Maternity Hospital Alumni; Ex-Secretary and Chairman Section on Diseases of Children, American Medical Association; Secretary Mississippi Valley Medical Association, etc. With seventy-three illustrations. Second edition, revised and rewritten. Price, \$1.50. Louisville, Ky.: John P. Morton & Company, Publishers, 1910.

This is an excellent manual for the use of nurses. It is well illustrated and clearly written. A glossary of medical terms in the back makes it additionally useful.

PATHOLOGY OF INFANTILE SCURVY.—C. A. Fife (*ibid*) says that recent years have added but little information to our knowledge of the pathologic changes in scurvy. The gross lesions are due to increased vascularity and more directly to hemorrhages in the various structures, especially the periosteum, bones and muscles. The subperiosteal hemorrhages occur in preference in the long bones of the lower extremities, particularly the lower ends of the femora. These hemorrhages may be slight or may almost separate the periosteum from the bone. The kidney may be the seat of hemorrhage without undergoing any inflammatory change. Albumin, casts and blood found under these circumstances do not indicate true hemorrhagic nephritis. The blood condition is essentially one of chlorotic anemia. Nucleated red cells, poikilocytes, macroblasts, microblasts, polychrome basophiles in the nucleated reds have all been seen. Recent work seems to indicate that the marrow changes are the basic pathologic processes in the disease. The lymphoid marrow becomes poor in cells and in blood vessels, is rarefied and converted into friable, scaffold-like tissue resembling embryonal connective tissue, which contains spindle cells and a few osteoblasts.

ARCHIVES OF PEDIATRICS

MAY, 1911.

ROYAL STORRS HAYNES, Ph.B., M.D.,

EDITOR.

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

HOUSES OF CHILDHOOD.

We are banishing the dumb-bell tenement in this country and building sanitary ones, with no inside halls or dark rooms. We have established day nurseries, where mothers may leave their babies during the day. We have an excellent school system, although along archaic lines. We have playgrounds multiplying everywhere. We have social settlements, where the attempt is made to regenerate the districts in which they are situated by the actual residence there of social workers, who are a real part of the community. But we have nothing as yet which combines all of these things, as do the Houses of Childhood, which have been evolved by the Real Estate Institute of Rome, and which are in effective operation,

Some years ago this corporation renovated several blocks of squalid tenements in the San Lorenzo quarter, where the most wretched crowding had existed, dividing up the buildings so that each small family might have its own little apartment, and tearing out all central structures to make a large courtyard in each block. These tenements they rule over with a benevolent despotism, which requires cleanliness, and gives annual prizes therefor. They have established in many blocks these Houses of Childhood—schools if you will, or nurseries, each presided over by a trained directress who makes her home in the block in which her school is, and becomes the guide, counselor and friend of the children's mothers. To the "House" the parents may send all their children between the ages of three and seven; but they must send them at specified hours and clean in person and clothes, and they must themselves coöperate in every way with the directress. If children appear unwashed or slovenly, if they are recalcitrant, if the parents do not set them a good example, they are sent away, and in the giving of the prizes for the best kept apartment the coöperation of the parents with the directress is taken into account.

Perhaps in this country there would be resistance to an authority which undertook to compel cleanliness and enforced coöperation in its educational methods. But in Rome it is certain that the presence of these Houses of Childhood is of the greatest benefit and is fully appreciated. The fact that the children can be away from home relieves the mother from their care during the day and makes for household cleanliness. The presence of the directress in the block gives the parents an opportunity to consult her when they will. She becomes one of their neighbors, to whom they may turn for help. The school is shared by all in the block, and they feel that it belongs to them.

Here, then, is a nursery, a playground, a sanitary tenement, a social center and a school in one. It is unique in its combination, but perhaps more unique in the kind of school it is, for these schools are the work of Maria Montessori, the first woman

medical graduate of the University of Rome. She has developed a wonderful system of educating children, based on an appreciation of their psychology. Her medical and philosophical studies early led her to take an interest in the education of defective children; and, following the work of the elder Séguin, she developed a method of special instruction for idiots which produced the most marvelous results. Idiots trained by her read and wrote and passed examinations suitable for normal children of their age, to the amazement of everyone. The application of these methods to normal children was the next step, for the question was inevitable, "If idiots can be taught to do this, what could not normal children do?"

Maria Montessori felt that by her methods normal children could far surpass what they are capable of under present forms of instruction.

In the Houses of Childhood she had her chance. The directresses are her pupils and apostles, and her methods are followed out. It would take an article quite as long as Miss Tozier's* to even explain these wonderful methods, which teach children of three and four to read and write without any of the effort the old way requires, and by touch and muscular sense rather than sight, or to tell of the remarkable results which have thrilled those who were watching the working out of these new ideas. We leave our readers, therefore, the pleasant perusal of her article, believing that, as a social experiment, these Houses of Childhood are of interest, and that as educational institutions they are revolutionary.

**McClure's Magazine*, May, 1911.

ORIGINAL COMMUNICATIONS.

CHRONIC INTESTINAL INDIGESTION IN EARLY LIFE.*

BY J. P. CROZER GRIFFITH, M.D.,
Philadelphia.

When I first received the invitation of your president to address you I was somewhat at a loss for a topic, but inasmuch as, according to the plan adopted by this Society, this is an open meeting to which the profession in general is invited, I have selected the subject of chronic intestinal indigestion in early life because of its great importance, and, even more, because the disease is so frequent that every physician has had his struggles in its treatment. For the latter reason especially it has not seemed best to present to you any abstract reports of cases, which, after all, could only duplicate similar ones in your own experience, but rather to review the condition as a whole with special reference to the causes and treatment.

The complex of symptoms in infancy and in older children, respectively, differs to such an extent, the one from the other, that a separate discussion is advisable. The disease at any age is one of the most difficult to treat successfully.

By way of definite limitation we must consider the malady as a functional one unattended by lesions, beyond, possibly, injection of the mucous membrane. It is true that ulceration may eventually follow in some cases, but this is to be regarded as a result of ileocolitis, which develops as a sequel. Gastric indigestion is often combined with the intestinal disorder, but probably oftener the latter occurs alone.

CHRONIC INTESTINAL INDIGESTION IN INFANTS.

Etiology and Pathology.—The condition in infancy is much more frequent in the first year of life, and especially in the first six months. Poor hygienic surroundings predispose, as does very greatly a congenital constitutional debility. This last is a frequent cause. The infants in such case may have been prematurely born or be the offspring of tubercular or syphilitic parents, or of others with some constitutionally unfavorable influence in the

* Address delivered before the New Jersey State Pediatric Society, January 19, 1911.

way of parentage. Another frequent predisposing cause is the occurrence of attacks of acute intestinal indigestion or acute enterocolitis. Of all etiological factors, however, an unsuitable diet is by far the most influential. It is on this account that the disease is far more frequently seen in those artificially fed, although it is true that breast-fed infants may readily develop it if the breast milk is of unsuitable character. The quantity of milk secreted by the mother and taken by the child may be constantly too great. In other instances the supply is far from sufficient, and in such the infant's general health suffers until finally the intestinal functions are insufficient to digest a properly nourishing supply of food. In still others analysis of the milk shows nothing whatever which can account for the persistent indigestion present. Sometimes it appears to be some constitutional trouble with the nursing mother, as when, for instance, she is of a highly neurotic temperament or shows other evidences of ill health, although the way in which the milk is affected is not discoverable.

In the case of artificially-fed infants, apart from faults similar to those mentioned in breast-fed babies, the fact that the supply is necessarily an unnatural one renders it unfit for many infants, and chronic indigestion is an unavoidable result. The chemical differences in the proteids, fats and sugars are impossible of entire correction, and in addition is the question of the differences in the ferments and other bodies, the importance of the action of which is still little understood. Oftenest, however, there is a very evident fault with some one of the ingredients, an amount of this being given which the digestion cannot tolerate. In addition comes prominently into play in bottle-fed babies the element of infection of the milk by germs of various sorts. In still other more advanced cases there is nothing discoverably wrong with the food, but the infant has reached a condition in which it is unable to make use of the elements supplied.

Just what are the principal faults with the diet in bottle-fed infants is a matter much discussed and concerning which a decided change of opinion has been taking place in recent years. Formerly indigestion was blamed especially upon too high a percentage of proteids, and especially of casein, in the food. More recently it has been claimed that the casein is the least harmful element, and success has been obtained by the "casein milk" recommended by Finkelstein and others, to which reference will

again be made presently, in which the albumin is removed on the ground that it is the most harmful proteid product. This theory is by no means universally accepted, and, although success has been obtained with this method of feeding, physicians who have long used whey, with its absence of casein, cannot forget the good results which have so frequently followed, and are unwilling to lay the chief blame upon the albumin of the milk. Doubtless there is a middle ground somewhere, which will eventually be established. There is, at any rate, a fairly general agreement at the present time that the fat of the milk, especially in the case of bottle-fed infants, is one of the most difficult ingredients to digest. As was the case with a number of other physicians in this country, working independently, I became convinced of this from clinical experience and clinical experimentation before much was written regarding it by German investigators, who have since established the fact on a scientific basis by metabolism experiments. The sugar, too, in some cases, but less often, certainly can cause trouble, especially in the production of fever, but whether only in that it makes the fat, for some reason, more difficult of digestion, or whether through its own action, is not yet determined. The addition of amylaceous foods to the nourishment for young infants, useful in many cases, undoubtedly in others is the cause of chronic dyspepsia. Many of the various proprietary foods are consequently a fertile source of this disorder.

The whole matter is still in the process of solution. It must certainly be recognized that although there may be a general rule evolved, and although fat-indigestion is a very common form, yet the question is, to some extent, an individual one and has to be determined largely for the individual child.

The researches of Finkelstein have awakened much interest, since if his theories shall be proven to be correct they go far toward revolutionizing the theories of the nature of chronic indigestion in infancy. We have long regarded bacteria as an active cause in this condition. That they are so is undoubtedly true to some extent, but these organisms would appear to act not so much by producing an infection—as we once thought—as by an intoxication through the products of their growth; while in very many cases it cannot be seen that the bacteria have any action whatever except a secondary one, namely, the causing of decomposition of food, the absorption of which indigestion has already prevented.

The primary element, then, in chronic indigestion, according to these views, is a fault in the secretory and absorbing power of the intestine, often with a resulting intoxication from chemical poisons produced. The disease is a disturbance of the digestive process—not a direct bacterial disease. Furthermore, the poisonous products are by no means always produced in the intestine itself, at least in the later stages, but may be the result of faulty metabolic processes in the tissues, depending originally upon the faulty digestion. It is in this way that we must explain, according to Finkelstein's views, the advanced stages of infantile atrophy, where, in spite of no apparent disturbance of the digestive process in the stomach or intestine, so far as vomiting or disordered stools are concerned, there is still a progressive loss of weight until death takes place.

Symptoms.—In some cases there is constant diarrhea, the stools being watery, greenish and containing curdy masses of various size and often mucus. In other cases the stools are only occasionally of this nature; or there may be a chronic constipation, the stools often being pasty and too light in color and sometimes hard, either in small scybalous masses, or in larger form with difficulty in evacuation. In any event, microscopical and chemical examination often reveals undigested food, especially fat; free, or in the form of soap. The frequency of the presence of undigested proteid matter in the stools is much disputed, but the general experience of those who have made chemical studies would indicate that the whitish masses are seldom proteid matter to any considerable extent.

Vomiting occurs occasionally in most cases, but is not a constant or troublesome symptom unless the disease is complicated by gastric indigestion. The abdomen is usually distended by gas and there is frequent colic in cases with constipation. This is less often true of cases with diarrhea. The appetite is generally good and sometimes large. There is often irregular fever alternating with low temperature. It is only when symptoms of constitutional intoxication develop that fever is more constant. The urine may show the presence of acetone and an increased output of nitrogen in the form of ammonia, but this is not always the case. In some instances there develops an intolerance of cows' milk in any form, its administration being followed by an exacerbation of the symptoms, including vomiting, diarrhea, fever, and sometimes cutaneous eruptions and evidence of a dis-

turbed nervous state. The chief symptom, however, is *persistent increasing malnutrition* with all the characteristic evidences of infantile atrophy. The children gradually waste more and more, suffer from low temperature, feeble circulation, anemia and increasing debility. They are usually constantly fretful in the early stage and often apathetic in the advanced cases. At this period it is a common occurrence that no direct evidence of indigestion of the ordinary sort is discoverable. Vomiting may be infrequent and the stools always, or at least for the most part, present little evidence of indigestion, but we are between Scylla and Charybdis, for underfeeding these children causes a continuance of the loss of weight through starvation, and feeding the normal amount is followed by an even more rapid loss of weight, often with attacks of autointoxication of a severe and threatening character.

The *complications* are somewhat numerous. The disease may readily pass into an ileocolitis of a chronic form, and death result from this, with the finding of the characteristic lesions post-mortem. Thrush is common. Intertrigo, especially in the region of the anus, is likewise frequent. Furunculosis and other suppurative lesions of the skin may appear and petechiæ develop before death, and a terminal nephritis or pneumonia is often observed.

Diagnosis.—The advanced cases are to be distinguished chiefly from cases of atrophy depending upon other causes, such as tuberculosis and syphilis. The history of early digestive trouble preceding the atrophy is generally sufficient to establish the diagnosis of chronic intestinal indigestion if no positive symptoms of congenital syphilis or of tuberculosis are discoverable. The diagnosis of the *cause* of the intestinal dyspepsia is also important but often very difficult. A careful consideration of the earlier history of the case, with special reference to the nature of the diet employed, is frequently a great aid in this direction. An excess of starch in the food produces watery, irritating movements, sometimes offensive, sometimes with an acid penetrating odor suggesting acetic acid. Excess of sugar occasionally acts in much the same manner. Excess of proteid may produce constipation, or diarrheal stools with a putrefying odor, and curdy masses may be present. Excess of fat may result in either constipation or diarrhea. In the former the stools are of a gray or white color and offensive odor, and are composed almost en-

tirely of fatty soaps. When diarrhea is the symptom the stools are pale yellow, with a sour and offensive odor, and more or less glistening from the presence of fat in excess.

Prognosis and Course.—The course of the disease is very variable and the duration uncertain. At best it is long continued and lasts for months before recovery is assured. In some instances the loss of weight is constant. In others there may be long periods during which the weight is stationary, or even in which temporary improvement and increase of weight occur, to be followed, however, by relapse. In still others, not too far advanced in the disease when coming under observation, there is eventually more or less steady increase of weight and return to general health. In nearly all, however, there are liable to be exacerbations depending probably upon intercurrent acute dyspeptic attacks of the stomach and intestines, advancing to the stage of intestinal toxemia. Vomiting may then, for a time, become troublesome or diarrhea be a marked symptom, while fever develops. Death may occur as a direct result.

The prognosis is always serious, especially in those cases in which there appears to be no active intestinal disturbance and in which no improvement in weight takes place no matter what change in diet is made. In the majority of cases death follows finally from exhaustion or from some intercurrent complication. Sometimes the terminal condition exhibits the symptoms of pseudomeningitis.

The earlier in the disease that treatment is commenced the greater is the chance of recovery. On the other hand, the infant who has long tolerated the disease may be assumed to have greater resisting power. Serious although the malady is, even apparently hopeless cases will sometimes recover under proper treatment; but without treatment there is little chance for improvement. There is, moreover, constant danger of relapses from slight and undiscoverable causes. When recovery does take place it is usually finally complete, and the condition of the child in the second and third years often seems to be no worse as a result of the illness in the first year of life. Some cases, however, continue delicate or later suffer more or less from intestinal disturbances.

Treatment.—*Medicinal* treatment is purely symptomatic. Constipation is to be relieved by enemata or gentle laxatives; occasionally by free purgation if there are symptoms of acute gas-

tric or intestinal indigestion. Diarrhea may be checked by appropriate means. Colic may be aided by measures suitable for this disorder. The strength must be sustained by stimulants; the body temperature by external heat. During an exacerbation brief starvation must be instituted and a purgative administered. This is especially true if symptoms of intoxication have appeared.

In the line of *hygienic* treatment care must be taken that the infant has abundant fresh air. This is a matter of great importance. It is well recognized that infants with malnutrition, confined to close hospital wards, do not thrive, whether chronic intestinal indigestion or other agent be the cause. The infant may be kept in bed and the windows of the room open; or, if well enough, it may be taken out of doors daily—the bodily temperature in cool weather being sustained by the free use of hot-water bottles. It is only when the exposure to cooler air is followed by dangerous depression of the child's temperature in spite of efforts to prevent this that the airing described must be avoided. In such cases the infant must perforce be kept in a well-warmed room until sufficiently improved to bear the cooler air. The duration of the exposure to the out-door air varies with the case; very short at the beginning; longer as tolerance is acquired, until at least several hours daily are spent out of doors. I have certainly had better results with patients with indigestion since I have treated them by the open-air method.

In very feeble infants rubbing the body under the covers with warm oil should replace the bath. In others a daily sponge or tub bath is of advantage, provided a good reaction follows.

By far the most important treatment, however, is *dietetic*; and this is frequently one of the most difficult problems which the physician ever encounters. In the cases of chronic indigestion in *breast-fed infants* too great haste must be avoided in advising weaning. I cannot too strongly insist upon this point. Sometimes a regulation of the mother's diet and method of life will suffice, or some alteration in the frequency of feeding made. In other cases the giving once or twice daily of an artificial food may answer. Pfaundler has claimed, I believe with reason, that the employment of even a small amount of breast-feeding enables the infant in some way to digest the cows' milk, which forms the bulk of its food; possibly by supplying the normal ferments of human milk.

Some infants, in spite of evident failure to digest breast milk

perfectly, continue to thrive in other respects, and in such it is certainly well to delay the withdrawing of breast-feeding, as there is no certainty that artificial feeding may not have a worse result. The temporary withdrawal of the breast for twenty-four or more hours at a time may suffice in such cases. When, however, the indigestion is persistent and the child is losing ground in spite of faithful efforts to remove the difficulty, of course weaning becomes necessary.

In the dietetic treatment of *artificially-fed* infants with chronic intestinal indigestion, the first thing necessary is a very careful study of the previous history, in the effort to determine what elements of food, or fault in its preparation, has originally produced the disease, or has maintained it. The minutest details should be ascertained. Then, especially if active symptoms are present, a moderate starvation for twenty-four hours or longer should be enforced. For this purpose some thin cereal decoction, such as barley water or arrowroot water, is generally of service, as the amount of nourishment contained is inconsiderable, and it satisfies the mother better than the ordering of simple water would do. After this, some form of diet must be selected. Here there is a large choice, depending upon what the dietetic cause of the disease appears to have been. As very often it seems likely that both fat and casein are not easy of digestion, the employment of *whey* is frequently very serviceable. Whey contains less than 1 per cent. of fat and only the noncoagulable proteids. Its sugar percentage is practically that of untreated cows' milk, but this can readily be raised to a desired 6 or 7 per cent. by adding the requisite 2 or 3 per cent. of milk sugar, *i.e.*, two-fifths of an ounce, or three-fifths of an ounce to each 20 ounces of whey. When there appears to be a very special intolerance of butter-fat, as shown by the frequent sour vomiting or by the discovery of an excess of fat in the stools, the whey may well be made of skimmed milk. But whey, even with the addition of sugar, is a weak food, not containing sufficient calories to enable a child to thrive long. This at least is the theory. Nevertheless, many children certainly improve in health upon it and gain weight for a considerable time.

If whey has agreed, but it has become evident that a stronger food is required, an addition to it must be made. When it appears that the difficulty has been with the digestion of casein and that the fat is well borne, small amounts of cream may be added

to the whey. Using a 20 per cent. cream (the upper 4 ounces of a quart) we find that every ounce of cream added to 20 ounces, the balance of which is whey, adds 1 per cent. of fat to the mixture, but adds only so small an amount of casein that, when but little cream is used, it is a negligible quantity. On the other hand, when fat indigestion seems to predominate—as is certainly the rule—the strength of the food may be increased by adding skimmed milk to the whey, every ounce in 20 of the mixture increasing by about .175 per cent. the proteid strength. Where there is still doubt whether the proteid may not, after all, be at fault, the milk, either skimmed or otherwise, may be peptonized and added in small amounts, gradually increasing, to the whey. According to the methods usually followed for peptonizing, milk treated with pancreatic extract is not completely peptonized. If such milk is mixed with whey any excess of rennet remaining in the latter will act upon the still unaltered casein of the milk and coagulate it. To prevent this it is necessary to raise the whey to the temperature of pasteurization and thus destroy the rennet ferment before the whey is added to the milk. It should not, however, be scalded, or the lactalbumin will be coagulated by the heat. The pancreatic extract with soda is always to be preferred to the peptogenic milk powder on the market, as no sugar is contained in the former and the ingredients can therefore be modified in amount to suit the case. Moreover, the formulæ which have been recommended by the makers of the peptogenic milk powder have been, in my opinion, far too strong for most young infants even when healthy, and I have seen them many times the cause of digestive disturbance. With the skimmed milk whey and peptonized skimmed milk mixture I have succeeded in many cases.

The “casein milk” recommended by Finkelstein and Meyer is prepared by coagulating the milk with rennet and then straining off the whey. The coagulum remaining contains the casein and the fat, while the whey consists of the soluble albumins with the sugar and salts. The casein curd is then rubbed through a sieve and mixed with buttermilk. This latter is practically free from fat and sugar. The result is a food containing a high proteid percentage and a fairly good fat percentage. The fat is allowed to remain on the theory that it is digestible if the sugar has been removed. My experience with casein milk is limited. I have tried it in bad cases only and with no good result, but the

test is, of course, not a fair one. Some of my colleagues have used it with moderately good results, but have by no means obtained the success claimed for it by the originators.

In some cases milk in any form, even that of whey, is not well tolerated. In such the use of *albumen water* is sometimes of service to supply the needed nitrogenous matter. This may be given alone, or later fortified by the addition of some other food.

Cereal decoctions are of great value in many cases of indigestion, particularly after the age of four months. Before this date the power of digesting untransformed starch is not fully developed. In some instances, as already stated, when well diluted they are of service given alone for twenty-four or more hours, in order to prepare the digestive tract. Then milk in some form may be added to them. There is reason to believe that the old view is in part correct, that their function in some cases in young infants is chiefly mechanical, the starch mixed with the milk preventing the formation of such large curdy masses as would otherwise occur. It is certain, in any event, that the replacement of water by a cereal decoction as a diluent often renders a mixture more readily tolerated. Sometimes diarrhea is diminished in this way; in other cases constipation is relieved, especially if a decoction of oatmeal is the one selected. When it is desired to give a strong cereal gruel in order to add to the nutrient qualities, it may be dextrinized, as in the case of Keller's malt soup. Many cases of chronic indigestion thrive well on this preparation. Another very convenient method, of which I have made frequent use, is to add to a milk formula increasing proportions of a freshly dextrinized barley or arrowroot gruel, the gruel being of 10 per cent. starch strength by bulk; and one-tenth or less by bulk of a good malt extract being added to it while it is still warm, not hot. The addition of dextrinized gruel is particularly useful in cases of indigestion in which constipation is present and no gain of weight takes place, the required calories being supplied by the gruel to mixtures in which the proteid and fat are too low to supply sufficient heat units and yet cannot be increased without occasioning indigestion. If diarrhea is present, however, dextrinized gruels sometimes increase the trouble. In obstinate cases of milk intolerance it may be advisable to give dextrinized gruels alone for a time or with the addition of albumen water. Later small amounts of milk may be added in constantly increasing quantities. It may be remarked in this connection that whereas

a milk intolerance is of frequent occurrence, this is usually an acquired condition, demanding only a temporary cessation or withdrawal of all milk. With proper precautions in the avoidance of a hasty return to a milk addition, and with care that but small quantities, generally free from fat, are added first, I believe that persistent milk intolerance will be found to be of comparatively unusual occurrence. It may be necessary to avoid milk-addition for several weeks and then to add milk, perhaps but a teaspoonful at a time, and very gradually increasing the amount. In some cases where there appears to be a proteid indigestion the difficulty may be removed to a considerable extent by the addition to the food of citrate of soda, or of considerable amounts of lime water. Each of these substances checks to a considerable extent the coagulation of casein by the rennet in the stomach. Citrate of soda may be added in the proportion of one grain or more to the ounce of whole milk contained in the food.

Buttermilk is of great value in many cases, especially where there is difficulty in the digestion of fat. Its very low fat-percentage, the high carbohydrate-percentage which it possesses, prepared as it usually is with the addition of flour and of cane sugar, and its high proteid percentage, make it nutritious, while the fact that the casein has already been coagulated by the acid and then broken up by churning into very fine particles makes the formation of large, curdy proteid masses impossible. My results with buttermilk have been most encouraging. I have at the present time a number of infants thriving upon it who have failed to do well on all other methods I have tried. Yet in many cases this method too is unsatisfactory.

With the use of the substitutes for milk feeding in the form of the very numerous proprietary foods on the market, I have had a large experience in the practice of other physicians. Little, if anything, is to be gained by their use which cannot be obtained by some of the methods already outlined, and the lack of sufficient general knowledge of their composition prevents physicians, as a rule, from using them intelligently. In no disease is the study of the individual of greater importance, and this is seldom made when proprietary foods are used. It is only by such study, and by the consideration of the apparently unimportant matters, that success can be obtained whatever the food employed.

Many cases are encountered, however, as I have already pointed out, in which no change of diet made appears to influence

in the slightest the general condition of the child. There may be neither vomiting nor diarrhea, but the weight remains stationary or gradually diminishes. The infant has, in fact, reached the condition described by Finkelstein as "alimentary decomposition," where it is no longer able to utilize any artificial food given. In such cases nothing remains but to secure a wet nurse if possible. This often avails in a surprising manner, but often, too, fails because it has been deferred too long, and the digestive functions have finally become unable to utilize even the natural infant's food.

CHRONIC INTESTINAL INDIGESTION IN OLDER CHILDREN.

This exceedingly common affection in children past the age of infancy may manifest itself in typical form, or may give rise to symptoms especially of a nervous nature, which are very confusing. Disturbance of the stomach may be combined with it.

Etiology.—The most frequent cause is persistence with the ingestion of carbohydrates. Any starchy food may give trouble, but potato is one of those most liable to do so. The giving of candies and other sweets, allowing the child to eat when it pleases between meals, in some cases an excess of fat in the food, and swallowing without sufficient mastication, are among other dietetic influences. Food of any sort which is poorly prepared, or of an indigestible nature, is likewise a cause. The disease is consequently common in children who receive food from the family table at too early an age. Apart from these factors any debilitated condition of health predisposes. Consequently the disease is frequently associated with rachitis, or occurs after some exhausting, acute disorder. Age is important, the majority of cases developing especially in children between three and ten years old. As in infancy the disease is a functional disturbance, no lesions of the intestines being present, except perhaps injection of the mucous membrane and an increased secretion of mucus.

Symptoms.—In well developed typical cases the symptoms are very characteristic. There is very decided loss of flesh, the limbs especially being thin, and the child having a delicate appearance, with an anemic or sallow complexion, dark rings or puffiness under the eyes and perhaps sometimes a slightly yellowish tint to the scleræ. The pallor is sometimes replaced for a time by a red flush of the cheeks; on other occasions shows a great tem-

porary increase, as though the child were faint or nauseated. The appetite is variable and capricious and generally poor, although in some instances excessive. Eructation of gas is common, as is its passage per rectum, and the abdomen is usually distended and tympanitic. This abdominal distention is one of the most characteristic symptoms. Nausea and vomiting may occasionally occur if the stomach shares in the dyspeptic condition, but in some cases vomiting and headache appear to depend upon intestinal toxemia. The tongue is pale, flabby and perhaps tooth-marked; sometimes coated, sometimes exhibiting enlarged papillæ. It has seemed to me that the geographical tongue is particularly liable to be found in this disease. The breath is offensive in some cases. The condition of the mouth and tongue, however, depend largely upon associated gastric disturbance. The bowels are usually constipated, or constipation may alternate with attacks of diarrhea. The color of the stools is generally pale and sometimes nearly white; or at other times brownish. They are very offensive in odor, contain undigested food, and when loose are often frothy in appearance. Mucus is passed at times, sometimes in large amounts, the evacuation being generally accompanied by colicky pain. The mucus is mixed with the stool when this is loose, or coats it when formed. The element of abdominal pain is very variable, being somewhat colicky and paroxysmal, but oftener slight, and sometimes only reaching a sense of abdominal discomfort. The urine is not characteristic. At times it may show the presence of indican in considerable amount or of other bodies denoting digestive disturbance. The nervous symptoms are many and varied. In fact, they are the most prominent manifestations of the disease and may then readily deceive the unwary. Although mentally unaffected and often very bright, the child is irritable, languid, easily tired, and incapable of sustained mental or bodily effort. The hands and feet are cold, and the skin perspires readily. Sleep is nearly always restless and tossing, with frequent grinding of the teeth. Outcries and dreaming, and not infrequently night terrors, occur in these cases, as does walking in sleep. Wakefulness is not uncommonly a symptom. Attacks of faintness may occur, while in other cases there may be periods in which there is stupor or even convulsions. Convulsions in childhood are, indeed, often considered to be a manifestation of epilepsy when really dependent solely upon a chronic intestinal derangement. Shortness of breath is sometimes a symp-

tom, or the respiration may occasionally be sighing in character. In other cases asthmatic symptoms may be of digestive origin. There is usually little or no fever, or perhaps the constant presence of slight elevation of temperature of less than 100°F., except during the occurrence of exacerbations, when the temperature rises considerably. The pallor of the skin has already been alluded to. It does not necessarily depend upon an actual anemia. In some cases the skin is unnaturally dry; in other cases there is an urticarial or erythematous eruption. The general health suffers and the children develop poorly in height and weight.

The group of symptoms described is not seen in its entirety in every instance. In the milder cases, or those which have lasted but a short time, the disease is rather a series of acute attacks of moderate severity with intervals of comparative health and with but little influence upon the general condition. In other cases symptoms of a severe type, with a degree of wasting suggestive of pulmonary tuberculosis, are attended by the passing from the bowel of unusually large amounts of mucus. To this complex of symptoms the title "mucous disease" was applied by Eustace Smith.

Diagnosis.—The nervous symptoms may be confusing if the condition of the digestion is not carefully studied, but with this exception the diagnosis is usually not difficult. The slight cough which often accompanies the wasting may suggest pulmonary tuberculosis, but examination of the lungs fails to reveal any anomaly. Tuberculous peritonitis exhibits tenderness and either the presence of fluid or some evidence of deposit in or thickening of the abdominal walls. The presence of intestinal worms often causes grinding of the teeth, abdominal pain, disturbed sleep and other nervous symptoms, but the administration of a vermifuge will reveal the cause. A careful and even a microscopic examination of the stools may be required to prove that food is passing in an undigested form and to show what its exact nature is.

Prognosis and Course.—Children with chronic intestinal indigestion, even under treatment, are usually slow in recovery. There is a tendency to acute exacerbations of gastric or intestinal disturbance. These occur at irregular, and often frequent, intervals, are provoked by slight and often undiscoverable causes, and are characterized by nausea, vomiting, diarrhea, slight fever, increased loss of appetite, and a greater manifestation of nervous symptoms. In the intervals between the attacks the evidences of

indigestion may at first be very slight, or, in the mildest cases, wholly absent; but it is not long before there is a fuller development and increase in severity of symptoms, until some signs of the disease are at all times present. The course of the disease at best is chronic, its length depending upon the nature of the cause, the severity of the symptoms, the duration of the disease when treatment is commenced, and the patience and faithfulness with which the prescribed treatment is carried out by the parents. Only in mild cases, or in severer ones in which the errors in diet and hygiene have been very evident and consequently easily corrected, can we hope for more rapid improvement. In the milder cases there is a certain degree of natural tendency to recover when puberty is reached; but this can in no way be depended upon, and, as a rule, there is little likelihood of spontaneous cessation in untreated cases. The prognosis of cases under treatment is, on the whole, good, except in those instances where little can be found wrong with the hygiene and diet, and where there seems to be a constitutional or early acquired and, finally, firmly seated tendency to lack of functional intestinal power. There is always, too, the danger in this disease that the impaired general health diminish the power of resistance to any intercurrent affection.

Treatment.—*Dietetic* treatment is the most important. First in this connection is to be considered the manner of eating. Attention must be paid to the condition of the teeth, since carious teeth, especially if painful, may render mastication impossible. Apart from this, there is a natural disposition in early childhood to eat with little mastication, and this readily becomes a fixed habit unless carefully guarded against. The life must be so ordered that there may be sufficient time to eat slowly. Eating a hurried breakfast in order not to be late for school is a common cause of chronic indigestion. The haste of the luncheon at school is often as harmful as the improper nature of the food sometimes taken at that time. Not too large an amount of food must be eaten at any meal. On the other hand, as appetite is often poor, meals may need to be more frequent than in health in order to obtain the ingestion of a sufficient amount of nourishment. Meals should be at regular intervals and no food at all given between them.

Those articles must be excluded from the dietary which are most liable to cause indigestion, or which have been found to do so in the individual case. This individuality is an important

matter, since what agrees with one child may disagree with the next. In general, however, as already stated, the food most frequently the cause of the disease consists of the carbohydrates and especially the starches. Consequently, in bad cases it would be best to eliminate starch almost entirely for a time, the child eating only meat, milk, beef-juice and green vegetables. As it is nearly impossible to institute such a restricted diet in children, and as most cases do not require it, we may generally obtain good results by merely limiting the amount of starch very greatly. Potatoes should not be given at all, as their digestibility is certainly less than that of some other amylaceous foods. As little bread should be used as possible. It should be stale, thoroughly toasted, or in the form of zwieback, but a small piece being given with the meal. Some unsweetened commercial biscuit, such as water crackers or oyster crackers and the like, given in small amount, may well replace bread at times. Among other starchy foods which must be used with caution are white and lima beans, peas, carrots and parsnips. Cereal porridges must likewise be partaken of in very small amounts, if at all, and such as oat-meal or those of whole wheat avoided, on account of their more irritating character. Arrowroot, rice and farina are to be preferred, but, if possible, in well-marked cases it would be better to give no starch whatever until improvement is well established after several weeks of treatment. Even the soluble carbohydrates, the various sugars, maintain the state of indigestion. This is particularly true of candies, jellies, jams, and preserved fruits. Consequently these are to be avoided, with only a very small amount of cane sugar as a necessary sweetening, used only if one cannot do without it. Fruit comes in the same category, and should not be given until improvement is distinctly under way. Baked apples, prune juice and orange juice are, perhaps, the best. What is said of other saccharine foods is true also of the various malted or dextrinized breakfast foods on the market. Their administration should be deferred at the beginning, and then commenced as an intermediate step in the return to ordinary cereal foods.

Another very powerful factor in producing indigestion is fat. Consequently all fats, including butter, must be prohibited early in the case and the fat removed from any meat given. In severe cases it may be necessary to use skimmed milk. I have seen some instances in which the mere removal of a portion of the cream from the milk was all that was required to effect a cure. All fried

foods and pastry are to be rigorously excluded. Cocoa is sometimes well tolerated, sometimes not.

A highly proteid diet is often one of the best. Broiled or roast beef, mutton or chicken is usually well borne, in amount depending upon the age of the child. For young children it should be scraped or minced finely, and this may be necessary for older ones as well, if thorough mastication cannot be successfully insisted upon. Beef-juice is useful, although not very nourishing, unless in larger amount than can be given with success in most cases. Broth, with the meat fiber retained in it in finely divided form, is serviceable, but thickening with any starchy addition must be avoided early in the case. The fat should be thoroughly removed from the broth before it is eaten. The best of the proteid foods in most of these cases is undoubtedly milk, which should form a large part of the diet. If there is difficulty in digesting the casein the milk should be partially peptonized; or even completely so, if the child can be induced to take it in this way. The removal of the fat by skimming may be necessary, as already mentioned. Koumys, kefir, buttermilk and matzoon are sometimes very serviceable. Eggs form a valuable food for many children, but are not well borne by many others. It is rarely advisable to allow them every day. Boiled fish is often useful, and oysters, raw or very slightly stewed, are well digested by some patients. Sometimes one of the highly-proteid proprietary foods on the market may be employed.

Useful vegetables in many instances are string beans mashed through a colander, spinach, squash, stewed celery, stewed salsify, asparagus tips and lettuce. The time of beginning these varies with the age of the child and with the necessity of finding some food to take the place of the articles which are forbidden. When possible, their administration should be deferred for some months in cases at all severe. Young cauliflower, Brussels sprouts and onions are theoretically valuable members of this class of vegetables, but their strong odor and taste often make them indigestible.

Last of all, when other foods are found to be well tolerated and convalescence is well established, but even then only after a period of some months, a very cautious return to the ordinary use of starch may be attempted, allowing only small quantities at first. It may be that potato cannot be given at all for a long time. Months, or a year or more, may be required to effect a cure. In

the event of a relapse occurring, the diet should at once be reduced greatly, employing the simple regimen with which the treatment was commenced. An absolute skimmed milk diet for a short time is often successful on these occasions.

A diet list for cases of chronic intestinal indigestion in which a certain amount of starch is permitted and in which whole milk and eggs are tolerated would read somewhat as follows, varying, of course, with the age and the individual requirements:—

Breakfast—7 A.M. Milk with lime water; soft boiled egg or mutton chop, fish or cold beef; a slice of bread without butter, or zwieback, or water crackers or similar unsweetened biscuit.

Lunch—11 A.M. Milk or broth free from fat.

Dinner—2 P.M. Roast or broiled chicken, beef or mutton free from fat, or sweetbread; spinach, string beans, stewed celery, stewed salsify or asparagus tips; bread or crackers as at breakfast. For dessert, junket, baked apple, prune pulp, or gelatin foods with little sugar.

Supper—6 to 7 P.M. Milk, buttermilk, or broth; with bread as at breakfast.

Hygienic treatment is also of importance. A daily cool morning sponge is conducive to improvement of the general health. There must be sufficient sleep in a well-ventilated room. The mid-morning nap should be continued as long as the child can be induced to take it. If this period is passed, at least an hour's rest recumbent, in the middle of the day, preferably before the mid-day meal, is very useful in many cases. Life out of doors is important. Whether or not the child shall attend school must be determined for each case individually. Against the confinement in school is to be balanced the disadvantage of lack of occupation and of companionship, which staying at home often entails. Fatigue, either mental or physical, is to be carefully avoided. Clothing must be regulated to provide sufficient warmth without occasioning too free perspiration on exercise. Bare legs are not to be allowed, as the chilling which is liable to occur predisposes to interference with digestion. Massage is useful for patients too debilitated to take sufficient exercise. Hygienic measures to obtain a daily evacuation of the bowels are of the greatest importance. A fixed daily hour should be selected when there is nothing to hurry the child, at which time it should remain upon the toilet for a quarter of an hour or more, yet without straining efforts, in the hope that the habit of evacuation may be acquired.

Massage of the abdominal walls and of the colon through them is frequently of much service.

Medicinal treatment is largely of secondary consideration. The overcoming of the constipation, which is such a common symptom, is important. In addition to the hygienic measures referred to, either small daily doses of a saline laxative or of cascara, phenolphthalein or similar drug may be required. In other cases a small amount of sulphate of magnesia or syrup of rhubarb may be added to the tonic medicines administered. In bad cases the nightly injection of olive oil or cotton-seed oil may be of service. Very often the diet may be selected to overcome the constipation, bearing in mind, however, that many of the laxative foods are more or less irritating to the bowels. As a rule, enemata are not efficient, as they operate only upon the rectum. A drug is required which affects the whole intestinal tract. Where there is much secretion of mucus from the bowel, saline douching is sometimes of service, but this practice should not be continuous, as it sometimes maintains the symptoms which it is intended to cure. The administration of a good malt extract appears to aid the digestion of starch. One should be selected known to contain a large percentage of diastase, as there is a great difference among them in this respect.

In general, as far as other medicinal treatment goes, I have had the best results with the combination of an alkali with a bitter tonic. For this purpose, bicarbonate of soda may be given with tincture of nux vomica, compound tincture of gentian, and an aromatic water, administered ten to twenty minutes before meals. Cod-liver oil, although theoretically an excellent remedy to improve the general health, is often contraindicated, especially early in the disease, on account of its tendency to increase indigestion in many cases. The remark applies to the use of iron given for the anemia, since until convalescence is established this may increase the digestive trouble and the constipation.

Last of all, the importance of persistence in the treatment must be again emphasized. Unless this is maintained, and especially unless the dietetic treatment is rigorously followed for months, an improvement which has seemed very decided, and even a cure which has seemed complete, will inevitably be followed by relapse.

THE BLOOD PRESSURE IN CASES OF ACUTE NEPHRITIS OF CHILDREN.

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The point I wish to bring forward in this communication is that in the cases of acute nephritis occurring in young children the blood pressure is raised and often raised to a marked degree.

It would appear from the statements in text-books by authorities on children's diseases that this has not been recognized or has been admitted to occur only to a slight degree and that it is seldom that any degree of hypertension is sufficiently marked to be of any value in diagnosis.

It is admitted that it is extremely difficult in small children to determine variations in pulse tension by means of digital compression, but with the sphygmomanometer any change which may occur is easily noted. The fact that the sphygmomanometer has not been used to any extent among children will, I think, explain why so little change in the blood pressure has been found in acute nephritis. Batty Shaw, in a recent paper, states that out of observations on about 400 children admitted to University College Hospital during the last four years, not more than one or two showed pathological hypertension. I imagine that out of these 400 patients few, if any, were suffering from acute nephritis. I have been able to find only one reference to any actual sphygmomanometer observation in acute Bright's among children. This was by Stowell (*Albany Medical Journal*, 1900), and he states strangely enough that the tension is not raised.

I have made observations on 9 cases, 7 of which were cases of acute nephritis and 2 were chronic, with acute symptoms superadded.

The instrument used was a Martin's modification of the Riva Rocci one. The systolic pressure only was taken. The arm-piece was the standardized 12 cm. cuff. The observations were made as far as possible under similar conditions.

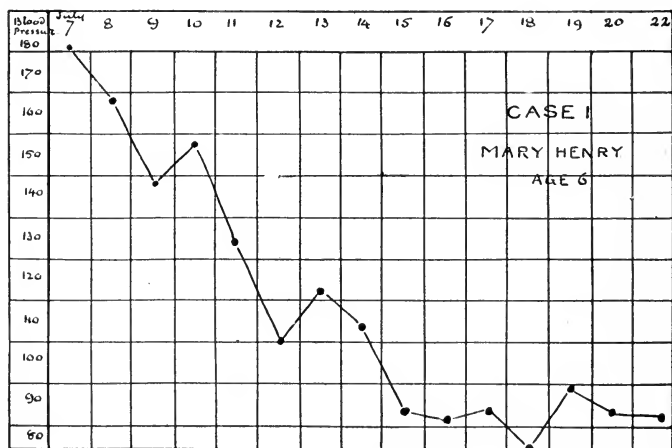
Before any results can be determined as to whether the blood pressure is raised or lowered one, of course, must know what the normal pressure for children is at different ages. The following

figures are the averages at various ages when worked out on a series of 170 cases between the ages of a few months and twelve years.

Under one year, 71			m.m. of mercury		
1	year old,	73	"	"	"
2	"	"	79.5	"	"
3	"	"	81	"	"
4	"	"	83	"	"
5	"	"	86.5	"	"
6	"	"	88.5	"	"
7	"	"	85	"	"
8	"	"	93	"	"
9	"	"	100	"	"
10	"	"	95	"	"
11	"	"	104	"	"
12	"	"	105	"	"

The only other figures I could find for comparison were those of Stowell, and his were slightly higher than mine. Other workers have given figures, but they are of no value for comparison, as the broad 12 cm. armlet had not been used. If a narrower armlet than the 12 cm. is used the figures are higher and the same uniformity in results is not obtained, as has been shown by Recklinghausen.

The following are short accounts of the cases under observation with their blood pressure charts.

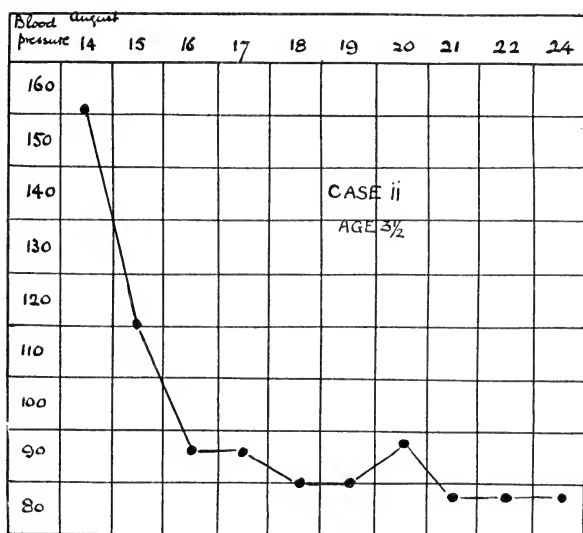


CASE I. Girl, aged six, suffering from acute nephritis. Urine S. G., 1.012; acid; albumin, 2 grams per liter, and casts present. It contained a large quantity of blood, being bright red in color.

There was only a slight degree of edema, noticeable at the ankles.

It will be seen from the chart that the blood pressure at first was at 180 mm., which is very high for a child of six, the average being 88 mm. In this case the blood pressure when estimated at the radial artery by the finger was thought to be slightly raised, but nothing like such a marked increase as the sphygmomanometer showed was expected.

It is of interest to note that when the pressure was high the patient was passing a very large quantity of blood in her urine. This was noticed in the other cases in which the tension was high.

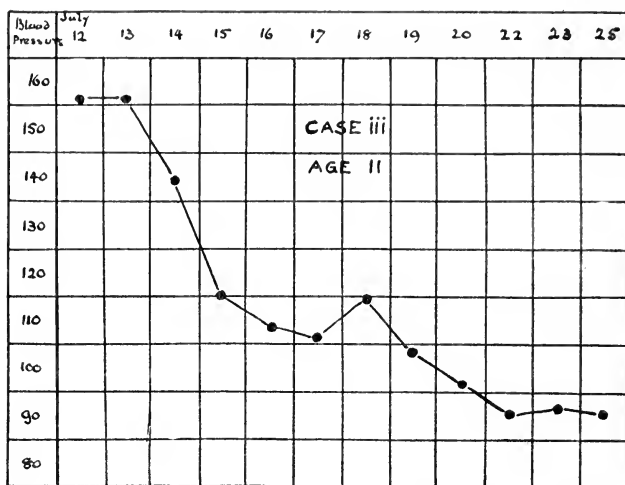


CASE II. Boy aged three-and-one-half. Suffering from acute nephritis. Urine S. G., 1.014; acid; albumin present, 4 grams per liter. Large quantity of blood, the urine looking almost like pure blood.

Epithelial and blood casts present.

The blood pressure was very high in this case, being 162 mm. The average for a child of three is 81 mm. In this case the drop in the tension was rapid, the normal being almost reached on the third day.

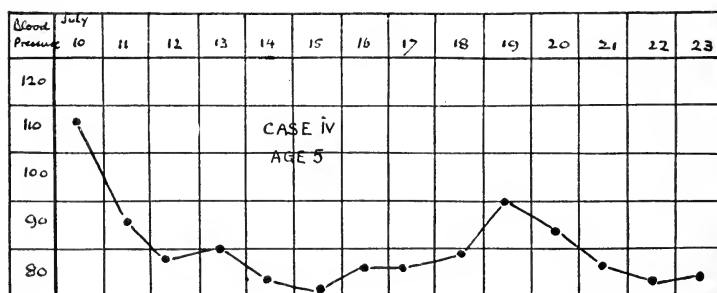
There was very little edema in this case.



CASE III. Boy aged eleven. When first seen he was suffering from uremic fits and in a comatose condition. He improved, and within five days the mental condition appeared normal and there were no more fits.

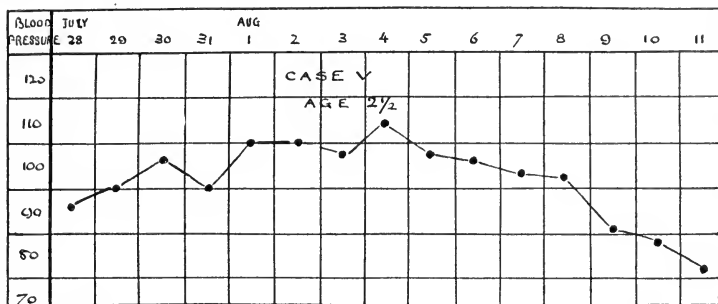
Urine, acid. Large quantity of albumin and blood present. Blood and epithelial casts.

The pulse tension was very high in this case, being 160 mm., 104 mm. being the average for a boy of that age. The edema in this case was also very slight.



CASE IV. Boy, aged five. Admitted to hospital suffering from acute nephritis. The edema was slight but more marked than in the 3 preceding cases. Urine, acid. Albumin, small quantity present. Blood present but not in large quantity. Casts present.

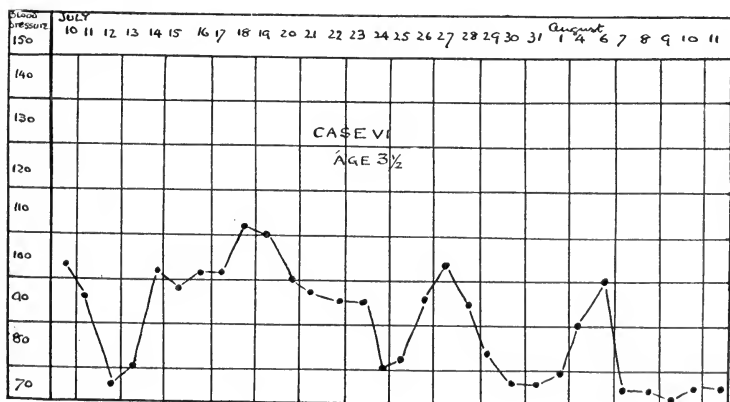
The blood pressure was raised in this case also, but not so marked as in the previous 3. It was 118 mm. when first admitted and then fell to about normal (85) in a few days.



CASE V. Girl, aged two-and-one-half. Suffering from acute nephritis. She was very edematous when first seen. Urine, acid. Albumin and blood present but in small quantities. Epithelial and blood casts. She did not improve for the first five or six days, and it was not until about August 3d that any improvement was noted.

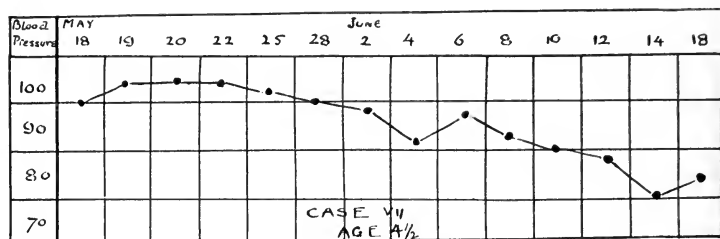
The blood pressure was only slightly raised at first, but continued to rise as the patient got worse. The highest pressure was 115 mm., which is high for a child of two-and-one-half.

The edema was great in this case and the quantity of blood in the urine slight.



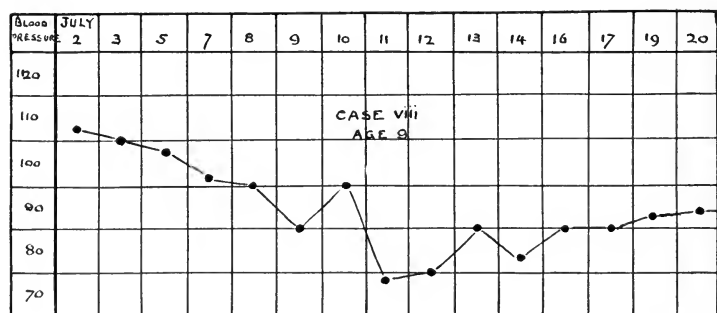
CASE VI. Boy, aged three-and-one-half. Suffering from acute nephritis. Edema slight. Urine, acid; trace of albumin; no blood.

On July 21st he developed a lobar pneumonia, and later, about July 30th, an empyema, which was drained. The blood pressure in this case was slightly raised but was not much above normal. The chart shows several rises and falls which are hard to account for. There was no rise with the development of the pneumonia.



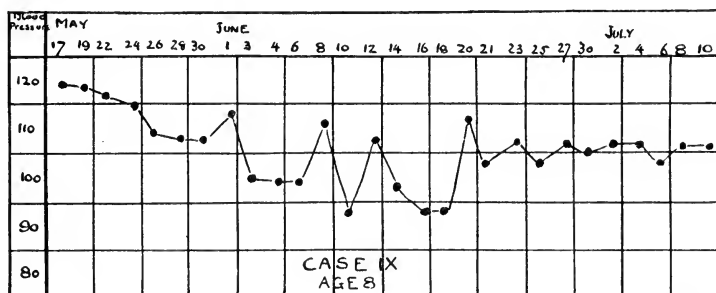
CASE VII. This patient had been in hospital for some weeks before any blood pressure observations were made. He was suffering from acute nephritis when admitted, but had much improved and the urine became free from any abnormal constituents when on May 18th he had a relapse, becoming edematous, the urine showing blood and albumin in small quantities. Blood pressure observations were made from this date onward until he was discharged cured. It will be seen that the tension is slightly raised above normal at first but gradually dropped as the patient improved.

The next 2 are cases of chronic nephritis with permanent damage to the kidney tissue. There was always a trace of albumin in their urine. They had both been admitted to hospital on several occasions suffering from acute symptoms.



CASE VIII. Boy, aged eight. The patient in this case had kidney trouble, dating from an attack of acute nephritis six

months previous to his readmission to hospital. The urine in the interval had always showed a trace of albumin. When readmitted to hospital he was suffering from acute symptoms, the edema being marked and the urine scanty, containing a large quantity of albumin, but little blood. The blood pressure at this time was 124 mm., which is high for a boy of eight. Unfortunately blood pressure observations were not made regularly, but the pressure was found to have fallen to normal when the patient had so far improved that the edema had disappeared and the urine showed only a trace of albumin. He remained well for six weeks, when, about July 2d, the urine again became loaded with albumin and the edema very marked. During this attack the blood pressure was estimated regularly and the chart shows only a slight degree of hypertension at first, with a fall in the tension to rather below normal as the patient improves.



CASE IX. Boy, aged eight. This is the other case of chronic nephritis. The condition dated from an acute attack when the patient was three years old. He had been in hospital eight times within the last five years, always suffering from very marked acute symptoms, the edema being great and the urine showing a very large quantity of albumin.

On May 17th, when the patient was very edematous and the quantity of urine small in amount with a large quantity of albumin in it, but no trace of blood, the blood pressure was raised, being 124 mm. It gradually fell as the edema disappeared and the boy improved.

From the foregoing cases the following conclusion is drawn, namely, that in children suffering from acute nephritis the blood pressure is raised and that this rise of the pressure may be very great. In 3 out of the 7 acute cases the hypertension was

very marked. This fact is of diagnostic value, as in no other disease of childhood is there to be found the same high range of blood pressure.

Those patients who had the highest pressure were those in whom only a trace of edema was noticeable, and also it is of interest to note that in these same patients the quantity of blood in the urine was very great, the urine indeed looking like pure blood; the explanation of the large quantity of blood in the urine being, probably, that a rupture of the renal capillaries had occurred consequent upon the greatly increased blood pressure. I shall not enter here into any discussion as to the cause of a raised arterial tension except to say that it appears difficult to explain the high tension and rapid drop which occurred in some of these cases except by assuming a large degree of spasm due to some toxin acting on the arterial walls.

I should like to emphasize the fact that in children it is only by means of the sphygmomanometer that changes in the blood pressure can be ascertained with any degree of certainty.

In concluding, I wish to express my indebtedness to Dr. Fowler for his kindness in allowing me the use of his clinical material at the Sick Children's Hospital, Edinburgh.

19 Atholl Crescent.

TUBERCULOSIS AND TUBERCULIN THERAPY IN NURSLINGS AND YOUNG CHILDREN.—Paul Romer (*Arch. f. Kinderhk.*, Bd. LII., H. IV.-VI., 1910) gives a résumé of the observations that have been published with reference to the use of tuberculin in children. The action of tuberculin is a very delicate test for tuberculosis, and an indication of immunity to it. The physician must consider the clinical and anatomo-pathologic results of its use. Heubner has declared that the use of tuberculin is contraindicated in young children. The author finds that young children bear a considerable dose of tuberculin well and are not injured by it. In the children's clinic at Cologne experiments were made with reference to the use of tuberculin in children. Records of 3 cases are given. It must be remembered that in infants resistance is minimized and tuberculosis early becomes generalized and ends fatally. Respiratory processes are infrequent in infants.—*American Journal of Obstetrics.*

CERTAIN FRACTURES OF THE UPPER EXTREMITY IN CHILDREN.*

BY IRVING S. HAYNES, PH.B., M.D.,

Professor of Applied Anatomy, Cornell University Medical College; Visiting
Surgeon to the Harlem and Red Cross Hospitals, etc., etc.

In this paper I shall briefly consider certain simple fractures produced by indirect violence and point out some of the practical features which are most important concerning them.

First. There is a distinct class of fractures found in children and not in adults, *viz.*, epiphyseal separations.

While these fractures are not especially difficult to deal with as regards their immediate treatment, their later results are often very serious. Inasmuch as the growth of the bone takes place at the cartilage line, injury at this point may result in premature ossification and consequent arrest of growth. This possibility should always be mentioned to the responsible member of the family. Another feature of fracture into or through the cartilage is that the adjacent joint may be involved, an excess of bone produced about the joint and its function seriously crippled or even destroyed.

Second. We find, especially in the young, that form of incomplete break generally designated as the "green-stick" fracture. In this the bone has not been broken entirely through, but bent sufficiently to rupture the periosteum on one side with a splintering of the cortex of the bone on that side and with more or less compression or impaction on the opposite side of the bone. In this variety there are absent the usual pathognomonic signs of fracture, *viz.*, abnormal mobility, crepitus and a false point of motion. One finds, however, angular deformity, swelling, "point-pressure" pain and loss of voluntary function.

Aside from the possible difficulty in diagnosis the practical point here is that this fracture cannot be properly reduced, as a rule, without first making it complete, because it is impossible to make the splintered ends of the fragments engage in their proper places with each other as the bone is straightened out. Unless this be done the angular deformity is bound to persist.

Third. Fractures in children are more apt to be transverse,

* Paper read and cases illustrating it presented at a Meeting of the Society of Alumni of Bellevue Hospital, January 4, 1911.

not such long splintering and oblique breaks as occur in adults. There is consequently a noticeable absence of such serious complications as compound fractures, transfixion of muscles, fascia or vessels, or extension into joints.

Fourth. Inasmuch as all physiologic and reparative functions are more active in children than adults, repair after fracture is more rapid and complete in them, with very much less likelihood of non-union than in the older.

Fifth. While there may be more or less permanent deformity due to one factor or another, after all fractures, we find the late results after this injury in children are much more perfect than in adults.

After the foregoing general considerations let us consider a few of the common fractures of the upper extremity, which derive their practical importance from their frequency and possible unsatisfactory results when not handled with due knowledge of the factors in the case.

Fractures of the Clavicle.—The only peculiarities of fractures of this bone in children are that very often the fracture is of the "green-stick" variety, or if complete is more apt to be transverse than in the adult. It usually occurs at the middle and outer thirds of the bone for well-known anatomic reasons, and is the result of an indirect force transmitted through the arm or shoulder, which in the adult usually results in a dislocation of the shoulder. While the statement has just been made that all "green-stick" fractures should be made complete as a preliminary to their reduction, when such a variety is found in the clavicle, the best treatment is to leave the fracture as it is if the deformity is slight, because if the bone is completely severed the resulting deformity is apt to be greater than without such reduction. If the fracture is complete its reduction, maintenance and results are more satisfactory than usually obtained in adults and in a shorter time, because there is less muscular development, less force to be overcome and less primary deformity. Retention of the shoulder during healing of the bone in an outward, upward and backward position is best obtained by combining a padded figure-of-eight shoulder dressing and a broad sling which passes beneath the elbow of the injured side and is tightly drawn over the sound shoulder. This dressing permits of daily inspection and correction. By no means should adhesive strapping be used for treating these fractures in children, as, first, it is not necessary to resort to

this means for satisfactory reduction, and secondly, if used it will soon excoriate the skin, become unbearable and hence useless.

Fractures of the Humerus.—Of the numerous fractures of this bone only a few will be considered, as separation at the upper epiphysis and supracondyloid fractures at the lower end. Both of these varieties possess great primary interest as regards reduction of the fracture and importance as regards the future function of the arm.

Separation of the Upper Epiphysis.—The line of the upper epiphysis runs first horizontally beneath the tuberosities until at



Normal shoulder at ten years.

the middle of the bone it bends downward and inward so that the surface of the epiphysis is cup-shaped, while that of the diaphysis is cone-shaped to fit into it. Ossification is completed at the twenty-fifth year. A separation along the epiphyseal line is usually produced by indirect violence transmitted through the entire extremity, as in a fall on to the hand. The mechanism is the same as that which may in adults produce a fracture of the surgical neck or in both children and adults a dislocation of the shoulder joint.

It is due in all cases to the establishment of a condition of leverage and the formation of a false point of motion at the ful-

crum. The individual falls, the extremity is thrown downward to save the body, the scapula is rotated so that its glenoid cavity is directed downward and forward to receive the impact and is *fixed* in this position. The hand receives the force, which tends



Normal elbow at twelve years.



Normal elbow at twelve years.

to abduct the extremity. As the scapula is fixed this cannot take place to any great extent before the lower part of the capsule of the joint is taut and the greater tuberosity of the humerus impinges against the acromion and coracoacromial ligament. A condition of leverage is at once established and the bone gives away at its weakest point—in children at the line of the epiphysis,

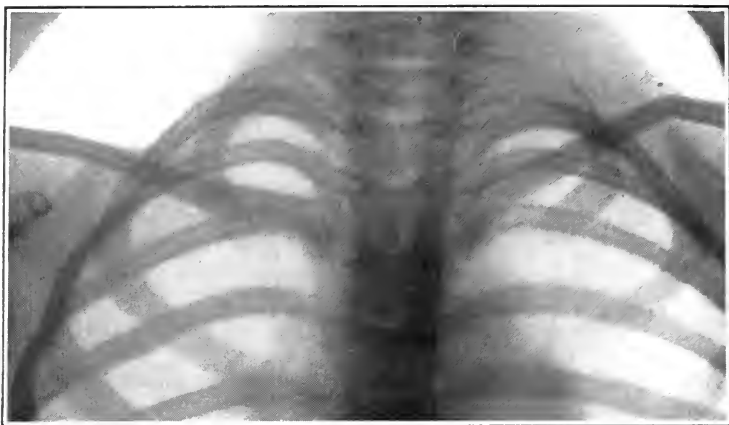
in adults in the same relative region; or perhaps in both the capsule of the joint ruptures first and a dislocation results. The deformity is typical and is due to muscular action upon both fragments and gravity upon the lower one through the rest of the extremity.

The upper fragment is abducted and rotated backward by the unopposed action of the attached muscles. The inner projecting lip of the lower fragment usually lodges in the hollow of the upper



Normal wrist and hand at ten years.

fragment, forming a protuberance over the front of the shoulder somewhat simulating a forward dislocation of the joint. The diagnosis from a dislocation is settled by finding the head of the bone still in the joint cavity and its failure to rotate with the shaft of the humerus. A very serious complication will be presented when this small upper fragment is dislocated outside of the joint. The reduction of the uncomplicated fracture is usually not difficult but its retention is, unless the mechanics of the problem are fully understood. The upper fragment is small and beyond the reach of the surgeon. The lower fragment is, however, under control through the arm. Apposition of the fragments is secured



Greenstick fracture of clavicle (six years).

by remembering that the upper fragment is comparatively fixed in its position of abduction by the tension of the muscles above and the lower half of the capsule of the joint below, and that the arm can be elevated in abduction until the shaft is brought into line with the upper fragment, complete apposition being obtained when the bicipital groove in each fragment is made continuous. The extremity is then fixed in this position of abduction and



Epiphyseal separation of head of humerus, before reduction (eight years).



Same after application of plaster spica. Abduction was carried a little too far.

slight external rotation by a plaster spica which envelops the chest and upper extremity as far as the wrist.

Union will take place in three or four weeks and the functional result is usually almost perfect.



Same case after abduction was lessened. Union was firm in this position at the end of three weeks, with apparently perfect anatomical and functional result.

The only objection advanced against this position of abduction of the arm is its awkward appearance and possible discomfort to the patient. While the position is certainly awkward to look at and for the patient to endure there is no other discomfort at-



Fracture just below the surgical neck of the humerus (eight years).

tending it. They get about, sleep and lead a perfectly happy existence.

At times reduction of the fracture can only be secured in some complicated cases through an open incision, and excision of the epiphysis in such cases may be necessary, but as this paper is limited to the simple cases these complicated instances will be omitted.

Supracondyloid Fractures.—These fractures are within the lower inch-and-a-half of the humerus. While there are a great many variations in the line of the fracture we shall confine ourselves to a consideration of the so-called “extension,” “flexion” and “adduction” forms of fracture.

The more common form is the “*extension*” fracture, in which the line of fracture is oblique from above downward and forward. The injury is produced by a fall on to the hand or forearm, the elbow is fixed in a position of flexion, the body acts as the weight to drive the humerus downward and forward, the lower end of

which is fixed by the position of the forearm; the two forces meet at the elbow and a break occurs at the lower end of the humerus through the disassociation of these forces. The line of this fracture is from above downward and forward, the "extension" form of supracondyloid fracture.

If adduction takes part in the mechanism, as is often the case, the fracture is usually at a lower level and an obliquity added from the outer condyloid ridge downward and inward.

If in falling the arm be more fully flexed and the force directed backward, the line of fracture may run from in front and above to downward and backward, producing the "*flexion*" variety of fracture. In the "*adduction*" form the line of fracture is directed from the outside and above downward and inward, the lower fragment consisting of a greater or less amount of the external condyle and the bone immediately above it. In addition to these fractures there may be a great number of variations added which we cannot consider at this time.

The recognition of these varieties is assisted by remembering and interrogating the position of the bony points about the elbow, by knowing that the "extension" fracture presents some of the



Transverse supracondyloid fracture of the humerus (eight years).
The so-called "extension" fracture.

characteristics of a dislocation of both bones of the forearm backward, also that the traction forward on the forearm which reduces the deformity in the above increases it if the fracture is of the "flexion" variety.

An exact diagnosis in fractures about the elbow is possibly more imperative than elsewhere on account of the disabling results of imperfect reduction and deformed union being here more serious as regards the comfort and usefulness of the patient than is the case with fractures anywhere else in the body.

Therefore it is necessary that all means for making a diagnosis be utilized, *viz.*, interrogation of the bony points with and without an anesthetic and X-ray photographs taken in both vertical and horizontal planes. Fractures which extend into the joint not only add to the difficulties of the diagnosis by the excessive amount of swelling that follows but also to the difficulty of obtaining the best results on account of the callous which forms in and about the joint, limiting its range of motion. It is never safe then to predict the final result with too much assurance, as Nature's reparative forces are so little under our control. There is one undesirable result which, however, I think we should consider within the range of our art to prevent, and that is recovery with loss of the "carrying angle"—a deformity both disfiguring in looks and with defective function of the limb.

The usual method of treating these fractures is by the application of moulds or splints embracing the shoulder and forearm with the elbow at the side. If there is little tendency for the lower fragment to be displaced forward or backward and the deformity is solely an overriding of the fragments, this method will give good results, provided continuous extension is made downward during the day by a weight suspended on the forearm close to the elbow while the wrist is fixed by a narrow sling that keeps the forearm flexed at right angles to the arm. Under no circumstances should the sling extend backward to embrace the elbow; by so doing there will be produced the very deformity you are seeking to prevent, *viz.*, loss of the carrying angle. This result is caused by the patient resting the weight of the arm in the sling. Naturally this brings the greater weight upon the ulnar side of the fragment, and by the steady pressure it is crowded upward more on this side than on the other. Union resulting in this position leaves the trochlea on a level with the capitellum and the normal angle of abduction is lost and the gun-stock deformity substituted.

While the extension by weight acts satisfactorily during the day with the patient up and around, it cannot be used if the patient is in bed by day or night. A good substitute is found through



The same anteroposteriorly. The excessive deformity does not show in this view, hence the necessity of taking X-ray photographs in two planes at right angles to each other. There is total loss of the "carrying angle."



The same elbow after extension had been made in the abducted position and plaster spica applied. Shortening entirely overcome.



The same case viewed anteroposteriorly, taken at the same time as the preceding photograph.



The same case after the elastic traction on the forearm had been in use for three days. Result anatomically and functionally perfect.

the means of a weight and pulley, or by the use of a short axillary crutch. The long arm of the crutch extends some six inches below the elbow, and to it is fastened an elastic band connected to a strap over the forearm close to the elbow. Whatever form of

traction is used it must not be excessive; slight, steady, continuous force being more efficient than severe intermittent traction.

In some cases, however, where the direction of the fracture is from above and behind downward and forward, or where there is comminution of the lower fragment, this method does not give that close apposition of fragments and consequently the best results so earnestly desired. Therefore I would suggest the method of treating these fractures with the arm in the abducted position.

Extension and apposition of the fragments is secured, with the patient under a general anesthetic, by making extension on the flexed forearm at right angles to the chest. A plaster spica is then applied, embracing the chest and fixing the arm in this position of right-angled abduction to the chest—and the forearm at



Fracture of the external condyle of the humerus. The "abduction fracture." (Age nine years.)

right-angled flexion to the arm. This position allows of extension and counter extension being maintained against the forearm and side of the chest without any danger to the axillary contents. Before the plaster splint is applied to the forearm, two moleskin adhesive strips, one to two inches wide, are applied to the dorsal

and ventral surfaces of the forearm. These adhesive strips reach to the palm of the hand. While applying the splint to the forearm, two narrow strips of thin board (as from a cigar box cover) an inch wide are incorporated into the dorsal surface of the splint. These strips reach to the end of the fingers. When the plaster has set the ends of the adhesive strips are attached to the ends of the wooden strips by strong rubber bands. This traction is not excessive, causes no discomfort, but it acts continuously to overcome any posterior displacement of the lower fragment. By this



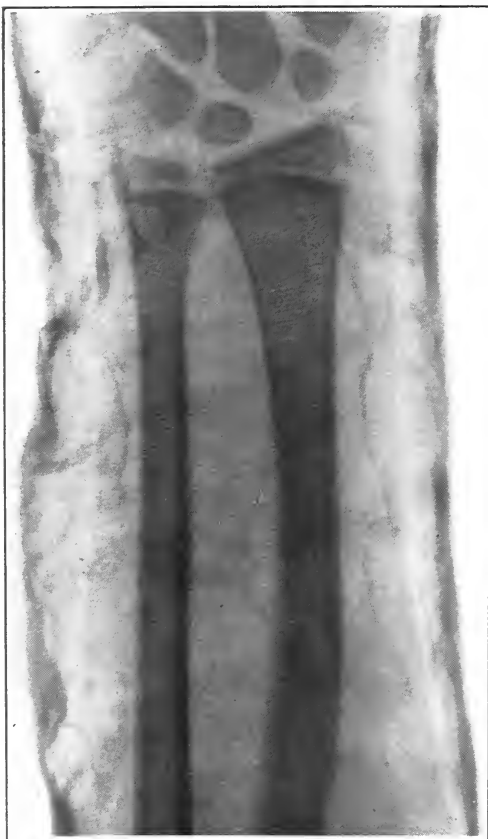
Fracture of the olecranon process. (Fifteen years.) Separation of the fragments due to flexion of the forearm.

method the carrying angle is preserved and owing to the effective fixation of the parts the formation of excessive callous is prevented and the attendant dangers of subsequent joint interference reduced to a minimum.

I am not in favor of treating fractures about the elbow in the extended position, though I recognize the fact that in this position you have control of the forearm and through it of the lower fragment and can fix the angle of abduction. However, one cannot prevent the backward tilting of the fragment in this position, and recovery will be followed by deformity and loss of function, especially in flexion.

I have not utilized the method of treating these fractures by

acute flexion of the elbow and fixation of the hand on the shoulder of the sound side, as advocated by Jones and several other writers, because my results with other methods have been satisfactory. I should expect, though, that this method would produce good results in the ordinary varieties of the above fractures of the humerus.



"Greenstick" fracture of the radius (eight years).

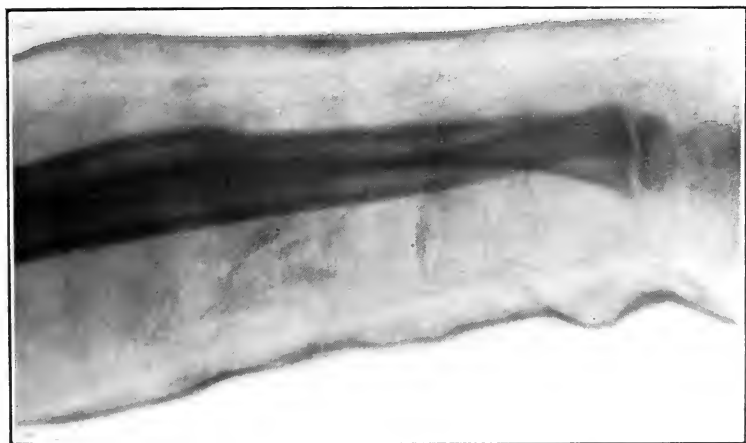
It would seem superfluous for me to reiterate the warnings contained in all the text-books against applying roller bandages directly to the extremity immediately after fractures or applying a tight roller bandage to the limb at any time on account of the danger of producing superficial sloughs or even strangulation of the limb sufficient to cause Volkman's ischemic paralysis, or even total gangrene of the extremity. But judging from our experience, from the cases reported in the medical journals from time to time, and from the fre-

quency with which such cases are aired in the courts, there seems to be a real need to repeat these warnings and cautions.

Fractures of the Forearm.—The most frequent variety consists of the green-stick fracture of one or both bones. The usual cause is a fall on to the hand, and due apparently to a very trivial force. The lesion is usually at the middle and lower thirds of the

bones. The objective symptoms are the deformity, point-pressure pain, swelling and loss of function. The interest centers about this fact, that unless the fracture is converted into a complete one it cannot be fully reduced, hence the necessity of completing the break.

As to the method of splinting simple fractures of the forearm I prefer to fashion my own splints out of any light board, as a cigar-box cover. These board splints, as Stimson emphasizes, must be wider than the diameter of the limb and well padded. I do not extend the splints beyond the wrist in any of these fractures, not even a Colles, because such extension is not necessary



Same case from the side. The deformity was subsequently corrected with a perfect result.

for maintaining the position of the fragments once they have been properly placed in line; second, immobilization of the joints of the wrist and fingers for two or three weeks may produce such stiffness in these joints as to require a longer time for the recovery of their function than is required for the healing of the fracture. Stopping the splints at the wrist allows the patient to begin exercising all the distal joints from the very first, so that when the splints are removed there will be normal motion in these parts.

I accept Stimson's verdict that interosseous splints are useless, because when put on tight enough to accomplish their object (separation of the fragments of the radius and ulna in fractures

of both bones), they cannot be borne, and if not put on as tight as this they accomplish nothing and hence are useless.

Fractures of the olecranon are produced in the majority of cases, not by a fall on to the elbow, but by a fall on to the hand with the forearm flexed. The olecranon being fixed by the contraction of the triceps forced flexion of the forearm by the weight

of the body snaps the olecranon at its weakest point, its middle, and then the patient's elbow strikes the ground.

The recognition of this fracture is easy. The amount of separation of the fragments depends more upon the flexion of the forearm than the traction of the triceps. If the forearm is fully extended no difficulty will be experienced in bringing the tip in contact with the shaft. Adhesive strapping over the tip of the upper fragment with the forearm extended is usually sufficient to secure close apposition and a firm union.

If fascia or muscular elements intervene between the fragments, as shown by the impossibility of bringing them closely together and securing sharp bony crepitus, it is proper to remove this obstacle and to suture the fragments through a vertical incision with kangaroo tendon or chromic gut sutures passing through the fibrous structures.



Impaction fracture in the lower end of the radius. Either this form or a separation of the lower epiphysis constitutes the "Colles" fracture in a child (nine years).

lar elements intervene between the fragments, as shown by the impossibility of bringing them closely together and securing sharp bony crepitus, it is proper to remove this obstacle and to suture the fragments through a vertical incision with kangaroo tendon or chromic gut sutures passing through the fibrous structures.

It is not necessary, therefore, nor wise, to drill the bones, and a suture of unabsorbable material is not required.

Separation of the lower radial epiphysis producing the symptoms of a Colles fracture requires no special consideration because of its occurrence in a child. It requires the same complete reduction of the deformity that the corresponding injury in the adult does, and as a rule gives more satisfactory results. However, the possibility of premature ossification and consequent arrest of growth in the radius must be entertained in the prognosis.

I have been asked to state my position in regard to the use of metal splints or other means, as nails, drills, screws, wire, etc., for the direct fixation of fractured bones.

To my mind their use can only be justified by the exceptional case, almost exclusively found in the adult, such as compound fractures with great deformity, fractures of the neck of the femur with great displacement of the fragments, or in cases of non-union of the large, long bones where correct apposition cannot be maintained without such appliances.

In any case, especially in children, the mere correction of a deformity does not justify one to resort to such severe means as the open method, with its real danger of infection, even under the most rigid asepsis, when sufficiently accurate apposition can be obtained under the use of an anesthetic and by appropriate splinting with traction applied patiently and intelligently during the first two weeks of any fracture in a child to secure a good functional result. Reparative processes in children are so rapid and bony irregularities so constantly and satisfactorily smoothed off and obliterated that the simpler and less dangerous methods give results nearly perfect anatomically and quite so functionally.

In passing, I might state that I have had to remove several of these bone plates, which had been placed in position by others more enthusiastic in the use of these metal splints than myself. Further, some of my colleagues, who formerly were partial to the use of these splints in simple fractures have after their more mature experience discontinued their use.

In all cases of fracture if in doubt give an anesthetic to assist in making the diagnosis, and if possible also seek the aid of the X-ray photographs. This will conduce to accuracy of diagnosis, more intelligent treatment of the fracture and better final results.

Before concluding this paper I wish to extend my thanks to

Dr. William H. Stewart, Radiographist of Harlem, Fordham and Gouverneur Hospitals, to whom I am indebted for the radiographs of my own cases and others from his collection to complete the series.

107 West 85th Street, New York.

RESEARCHES ON THE DIARRHEA OF INFANTS.—E. Metchnikoff (*Gaz. Med. de Paris*, January 1, 1910, p. 5) has studied the intestinal flora in acute gastroenteritis of infants, which he finds much less complex than in adults. This flora has a serious bearing not only in affections of the digestive tract, but also in disturbances of nutritive metabolism, and in diseases of the nervous system, skin, and kidneys. Experiments which resulted in causing diarrhea in young rabbits at the breast by administering portions of the stools of infants suffering from acute gastroenteritis, prove that this latter is an infectious malady. Experiments on chimpanzees gave analogous results, the influence of food and high temperature being excluded. The author at first thought that the infective agent was to be found in paratyphoid bacilli, but soon became struck with the constant abundance of *bacillus proteus*, occurring in 30 cases out of 40. It developed readily on gelatin. The experiments were then repeated by administering to the rabbits and chimpanzees pure cultures of *proteus*: the resulting infection, instead of showing itself as diarrhea, took the form of a fatal dry cholera. Assuming that *proteus* plays an important part in infantile diarrhea, a search for the source of the infection disclosed the fact that it was rarely met with in cow's milk. On the other hand, house dust and fecal matter from a number of animals contained it, and it is found on the outer layers of most food-stuffs, including cheese, grapes and salad. The author concludes that the microorganism is transported by flies from the dejecta of animals to the articles of diet which are consumed raw, and thus introduced into the digestive tract of persons who eat them. Prolonged contact of these persons with nurslings is sufficient to contaminate them with the microbe, which, though well tolerated by adults, provokes diarrhea in infants. Hence the means taken with regard to milk by sterilization, etc., are not sufficient, but attention must be directed to keeping the hands clean, washing certain food-stuffs, purifying the streets, and destroying flies.—*British Journal of Children's Disease*.

POST-TYPHOID DELIRIUM.*

BY ALLEN BAINES, M.D., C.M., ETC.,

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The status known as post-typhoid delirium is very seldom met with in children. In looking over the various hand-books on Pediatrics in my possession, I find the condition not noted at all, or very casually referred to as being uncommon.

Dr. Samuel Adams, of Washington, reported 4 cases at the meeting of the Pediatric Society in May, 1906, giving a clear and concise clinical report of each case. Dr. Adams termed it "Post-typhoid Mania." In speaking of my cases to Dr. Ernest Jones, Associate in Psychology at the Provincial Hospital for the Insane, Toronto, he demurred at the term "mania" and said, regarding my cases: "In the case of any mental disturbance arising during, or in relation to, an acute fever, such as typhoid, the immediate problem that arises is to decide whether it belongs to one of the two following fundamental different conditions:

"(a) Psychoses, in which the essential cause is the poisoning of the cortex. This condition would be called a toxic, or, more specifically, a typhoid psychosis. It may arise either during the fever (*e.g.*, many cases of delirium) or after (then often wrongly called post-typhoid neurasthenia).

"(b) Psychoses due essentially to deeper disturbances in the personality, where the fever has acted merely as an exciting cause of the outbreak, such as an accident; so may operate.

"Here the psychoses may be of any form, according to the more fundamental causes, and the diagnosis as to which form, or as to whether the condition belongs to group (a) or group (b) depends upon an exact study of the mental symptoms. Without knowing more about your cases, one could not decide as to the diagnosis, but from what you tell me I should strongly suspect that they belong to what we call 'anxiety hysteria,' the most frequent psychoneurosis in children. I have seen a number of such cases in relation to typhoid. Lastly I have to say that it would be quite improper to use the term 'mania' in connection with any such conditions. 'Mania' is a specific disease, or rather a form of a

* Read by title at the Twenty-second Annual Meeting of the American Pediatric Society, Washington, May 4, 1910.

specific disease (maniacal depressive insanity), which rarely occurs in children at all (the youngest case I have seen being fifteen years of age). Further the term 'maniacal' is even less appropriate. It is not necessary to remind you that the term is very far from being a synonym for screaming or excited."

This reasoning on Dr. Jones' part seems so clear and lucid that, coming from such a man, it lends weight to my altering the term "mania" to "delirium."

An article by Dr. J. Lovett Morse, published in the *Boston Medical and Surgical Journal*, February 27, 1896, in which 282 cases of typhoid fever in children are carefully analyzed, is probably the most exhaustive and instructive compilation on this subject to be found. Every symptom, complication and sequela is carefully considered in his own cases, and those of a vast number of well-known observers all over the world. The digest made of this mass of clinical information and the conclusions therefrom drawn are of a most valuable and reliable character. Too great time would be taken up in quoting much from this monograph, but a few excerpts as to acute delirium may be not out of place. No mention is made as to the subject matter in hand, viz., post-typhoid delirium, but as to delirium, he quotes:

Earle says: "In severe cases symptoms are very pronounced and meningitis simulated. Parrot thinks that stupor is rare and coma almost never occurs and that acute delirium is more common, and explains this by the undeveloped mentality of children. Henoeh, Strumpell, Earle and Wilson all agree that nocturnal delirium is often replaced by continuous and causeless screaming. These opinions are, however, applicable only to the delirium during the fever."

CASE I. Frank S., aged six years, born in China, the son of a missionary, parents English, admitted to Hospital for Sick Children, Toronto, October 25, 1909. Previous history, pertussis at one year of age; scarlet fever one and one-half years; dysentery twice, at eight months and at one year; lumbrici from five years and some seen recently.

Present History.—Eight days ago had a chill and sharp attack of vomiting, followed by pain in back of neck and general listlessness. Bowels constipated, spleen enlarged, a few pale rose spots on abdomen and flanks, mentally clear. Appeared to be a particularly bright, cheerful child.

October 17th, began to show signs of drowsiness and marked

lethargy; temperature had been high all the time, ranging from 104° to 106° F.

October 21st, condition about the same, pulse softer and poor tension. Tympanites more marked.

November 4th, the condition remained about the same; temperature lower, running 99° to 102° F.

November 8th, temperature normal. He is quiet and does not speak, takes nourishment well.

November 11th, doing very well until midnight, when he began yelling and kept on doing so until he could yell no more, his voice having disappeared. This state of affairs went on with varying intensity, the child often being quiet for an hour or two, but when spoken to or given nourishment, starting off with a vigor simply marvelous and extremely disturbing to others in his immediate neighborhood. It was not until November 19th that any marked improvement took place. The night nurse reported a quiet night and that he answered "yes" or "no" three or four times to questions. It was not until December 10th that he was really quite normal. It will be noticed that his temperature became normal on November 8th. On the 11th delirium of a maniacal character set in and lasted unintermittingly until December 10th, a period of over four weeks. From this time on the case presented no points of interest. It was one of steady convalescence, and he left the hospital December 22d, very fairly well. No drug or treatment of any kind seemed to have a quieting effect, or if it did, it was of such an evanescent character as to be hardly worthy of notice.

It is unnecessary to give a full history of the case, it being manifestly an ordinary attack of typhoid fever, having all the classical symptoms and verified by positive Widal and diazo reaction. I therefore give a few notes at some days' interval.

CASE II. Duncan M., age six years, admitted to hospital August 23, 1909, family and personal history unimportant. The boy was ill for two weeks before admission, having had frequent attacks of vomiting, loss of appetite, feverishness and general malaise. Physical examination showed nothing noteworthy. Temperature 102° F., which slowly receded to normal on September 8th, sixteen days after admission, probably thirtieth day of fever. On September 8th had a somewhat severe convulsion lasting fifteen minutes. There was a slight rise of temperature at this time, receding to normal next day. On September 21st he started screaming at the top of his voice. No remonstrance had any effect.

Small doses of codein had to be given at night to quiet him and for the sake of other children in the ward. Took nourishment very well. On the 23d, the phase of delirium changed somewhat; any remark made to him he would repeat over and over again, such as "Are you better Duncan?" as loudly as he could yell; at the same time his face became distorted as if in acute pain. On the 30th he became much quieter, having yelling attacks only three or four times a day, but was still very irritable. By October 6th, forty-four days after admission, he was quite normal, intelligent, quiet and bright. From this date convalescence was uninterrupted.

TUBERCULOSIS AND LACTATION.—Deutsch. (*Münch. Med. Woch.*, June 21 and 28, 1910), of Frankfurt, a/M, writes an unpretentious article on this subject, recording extensive personal experience. The question, "Shall a tuberculous mother nurse her infant?" enters into the campaign against tuberculosis; but it loses a little force from the fact that tuberculous women not only do not conceive in the ratio of healthy women, but also have a natural tendency to abort. Nevertheless, cases of childbirth in tuberculous women are not only plentiful enough, but not a few infants so conceived and born are vigorous enough to survive the ordinary risks of infancy. The problem thus becomes highly complicated. We deal only with actual births, not with the advisability of marriage and gestation. For a consumptive mother to nurse an infant is in itself a severe drain; but tuberculosis is a disease which, however severe it may be in its pulmonary symptoms, may still respect the organism at large. Certain individuals with the slow, fibroid type of pulmonary infection are able to discharge the ordinary duties of life for many years—if they are so situated as to be able to favor themselves. Mothers who come under this head may suffer for years from hemoptyses and various kinds of invalidism imposed by tuberculosis; and during this period may give birth to seemingly healthy children, who remain healthy for years. The author believes that women actually known to be tuberculous should never nurse their infants; those who are merely suspected of tuberculosis may nurse their infants under medical supervision until a clearer diagnosis is made. The nursing of an infant by a known tuberculous mother constitutes a double menace, prejudicial both to the child and the adult. In the warfare against tuberculosis, this contingency should be abolished at the start.—*Medical Record.*

STUDIES ON MILK SUGAR.*

(From the Medical Research Laboratory, Rush Medical College.)

BY HENRY F. HELMHOLZ, M.D.,

Chicago, Ill.

For my topic this evening I have chosen a subject that deals with one of the causes of infant mortality, and in its recognition as such becomes at once a means of reducing the excessive death rate from the acute gastrointestinal diseases. My subject is "Milk Sugar." To many, no doubt, it may be a surprise to hear milk sugar spoken of as an important factor in the etiology of these acute disturbances, but I hope to show you, before I have finished, that the recognition of the danger of sugar to the infant organism is one of the greatest advances in the solution of the artificial feeding problem and, as such, a very important means of reducing the excessive infant mortality.

To my mind, relatively too much emphasis has been laid on the freshness and purity of the milk and not enough on the form in which it is given to infants. The idea that the problem of infant mortality could be solved by furnishing all infants with milk of low bacterial content has predominated here in America. The danger from pure milk, *per se*, and from the sugar in particular, has received very little, if any, attention. Take, for example, the four stock formulæ put up by the Milk Commission of Chicago. What is the underlying idea upon which these modifications are based? The indigestibility of the cow's casein, for which there is practically no scientific or clinical proof.

It is time that we understood what the relation of each of the different elements of the milk is to the acute gastrointestinal disturbances, how these different components interact and how each one of them can only be considered in its relation to the others. As an example, let me cite the danger of fat when given with high percentages of sugar; its relative harmlessness when given with low percentages.

For many years the bacteria held the center of the stage, and our efforts were all directed toward finding a serum or vaccine with which to master this disease. There can be no doubt that

* Read before the American Association for Study and Prevention of Infant Mortality at the Annual Meeting in Baltimore, November, 1910.

specific bacterial infections do play a rôle in a small percentage of cases; but the fact is equally certain that the great bulk of the cases which make up our mortality records are due to improper feeding, especially in regard to the sugars.

It is only within the last few years that our attention has been called to the sugar of the milk as a cause of the acute gastrointestinal disturbances of infancy. Largely through the work of Czerny and Finkelstein an entirely new conception of these acute disturbances has been given us. The idea about which this new conception centers is the nutritional range of the infant from the minimum amount of food which is necessary to growth to the maximum amount of the food that it can take of without bodily harm. This upper limit is known as the tolerance for any food. The greatest tolerance is manifested for mother's milk; it is harder to render a child sick by overfeeding it with breast milk than with anything else. The same food—be it mother's or cow's milk—that acts as a food when given in amounts below the tolerance limit, will act as a poison when given in amounts above it, and the disturbances will vary according to which element of the milk is given to excess. The tolerance is lowered (1) by continued overfeeding, (2) by bacterial contamination of the milk, (3) by parenteral infection, and (4) by external heat. By each one of these factors the tolerance may be lowered beneath the amount upon which the child had been previously thriving. In such a case the toxic action of the food manifests itself by loss of weight and a train of symptoms that will depend upon the character of the food being given.

A slight overstepping of the sugar tolerance will lead to a condition called dyspepsia, marked by a slight drop in weight, an increased number of bowel movements and a slight rise of temperature. Gross increase above the tolerance or rapid lowering of the tolerance by heat, infection or toxins, give rise to typical cases of cholera infantum characterized by coma, rapid drop in weight, watery stools, fever, slow toxic breathing, leukocytosis, albumin, casts and sugar in the urine. This is the condition in which the little patients are usually brought to the doctor, and it is practically impossible then to form a definite conception of the cause of the disease from the history alone. It is only when one can observe the developments of such a case that deductions of some value can be drawn. In institutions where

there are large numbers of infants to be artificially fed, cases of cholera infantum (intoxication) occur with some frequency. Finkelstein, in charge of 140 orphans under one year of age, had occasion to see a large number of such cases, and by acute clinical study discovered the relationship of the sugar to this condition. By increasing the amount of sugar he could bring on an intoxication; by removing the sugar from an incipient case he could prevent its development. In like manner he discovered that the sugar was responsible for those cases in which there was only increased peristalsis, loss of weight and fever, and its withdrawal caused a prompt cure.

Two of the symptoms in particular deserve mention because of their intimate association with bacterial infection, namely, fever and polymorphonuclear leukocytosis. It has been definitely proven by the experiments of Meyer, Schloss and others that salt solutions and sugar, when given per os to dyspeptic children, can produce fever of 102° - 104° F., and polymorphonuclear leukocytosis as high as 30,000. We see thus that sugar can produce symptoms that we have been accustomed to associate only with bacterial infections.

Lactosuria is another symptom to which I wish to call attention more in detail because of its early appearance (it may be the first symptom of an impending intoxication) and because of its relation to the understanding of the condition as one of disturbed metabolism. The normal infant can handle from 2 to 3 grams of lactose per kilogram of body weight. If more than 3 grams of lactose per kilogram are given the child will excrete lactose in the urine. In intoxications the tolerance for lactose is greatly reduced; even when as small an amount as 5 c.c. of mother's milk is given at a time the urine may show a decided reaction for sugar. Figuring mother's milk at 7 per cent. sugar would make the tolerance less than $\frac{1}{80}$ to $\frac{1}{100}$ that of a normal child. This is explained by the assumption that the intestinal lining has been so changed that the sugar, instead of being split as normally, is rapidly absorbed and excreted through the kidneys. The normal permeability of the intestinal mucosa has been so changed that other toxic products may be absorbed. The question as to whether the sugar thus overflowing into the circulation acts toxically is still a mooted one.

As a natural development of this study came the therapeutic

food that has been brought forward during the last year of Finkelstein and Meyer. The excellent results obtained with the food prove in a very definite and concise way the importance of the saying that the elements of the milk cannot be considered separately, but must be considered as a whole. The fat is considered by many the most dangerous element of the milk in the etiology of acute gastrointestinal disturbances. In former times the casein has been accused as that element of cow's milk in which the dangers of artificial feeding centered. Here these two constituents are given the infant in large quantities, but in a mixture poor in sugar; and in this form of albumin milk they are a therapeutic agent for the cure of just such cases as they were supposed to produce.

Clinically, then, excessive amounts of lactose may cause a chain of symptoms, namely, fever, diarrhea, leukocytosis, prostration and death, which closely resemble the effects which follow the absorption of certain true bacterial toxins. Experimentally, too, it is possible to show that lactose fed in excess to pups will cause a similar picture. Pups about six weeks old were fed increasing amounts of lactose in sterilized milk. At first the pups increased in weight more rapidly than the controls, were very active, and seemed perfectly well. Upon still further increasing the sugar the weight increased more rapidly for a while; even after the stools had become thin and frequent. Quite suddenly there was a decided change. The pups began to lose weight rapidly, lost their desire for food and had numerous watery stools. During the next three days their flesh just seemed to melt away, and they died in a very emaciated condition, without any special symptoms. The sudden change from fat, well-nourished pups to sickly, emaciated animals in the short period of two days reminded one of the way in which infants just seem to fade away during an attack of cholera infantum. Increasing the amount of sugar produced also an increase in the rate of gain in weight up to the point where the tolerance limit was overstepped, then came the breakdown in metabolism and the rapid loss of weight that ended fatally in three days.

The controls that were fed on the same sterilized milk without lactose addition gained weight more slowly, but showed none of the acute symptoms of the sugar-fed pups. In none of the pups was there any urinary evidence of an acidosis. As the dog is a

carnivorous animal, that reacts very slightly to such dietary conditions as cause acidosis easily in human beings, the experiments were repeated in the very susceptible animal, the rabbit.

Feeding rabbits with lactose solution, in addition to their regular food, a similar train of symptoms was produced—diarrhea, loss of appetite, and an acidosis. Acidosis is quite characteristic of intoxication, so the agreement seemed quite striking. As the rabbit is very susceptible to withdrawal of food, the anorexia produced by the feeding of lactose may have caused the acidosis, so that a great deal of emphasis cannot be laid on these experiments, except as they show that lactose may produce bad results when fed to adult rabbits.

Although there can be no doubt that the sugar is an agent in causing these effects, there is a question as to whether lactose, *per se*, is the substance primarily responsible, or whether its excessive administration facilitates the entry of other toxic substances into the circulation. The *modus operandi* is of theoretical and practical importance. Comparatively recently Leopold and Reuss have made the observation that when lactose is injected subcutaneously into infants and dogs there occurs a quantitative excretion in the urine, if only a single dose is given. If the injection is repeated daily the amount of lactose which appears in the urine falls, until, finally, no lactose at all is excreted by the kidneys. It has been hinted that the gradual increase of tolerance for lactose so administered is analogous to the development of immunity by repeated doses of a true toxin. If this be true, it is of the greatest importance—this immunity reaction to lactose, a compound of very simple chemical formula.

There are, however, certain criticisms to be made of the work of Leopold and Reuss. First, their method for measuring the amount of lactose excreted did not exclude the possibility that a mixture of sugar in the urine gave rise to polarization figures that corresponded to a quantitative figure for the amount of lactose injected; and, second, lactose subcutaneously injected may be excreted by certain channels other than the urine, so that the disappearance of the lactose from the urine is not necessarily a criterion for the destruction thereof in the body. In making a systematic study of the relationship of lactose to intoxication, Dr. Woodyatt and I have had occasion to repeat the work of Leopold and Reuss, using an improved method and laying more stress on the possibility of the existence of a mixture

of sugar in the urine following injection. We could show that by fermentation a portion of the reducing and rotatory substance was lost after the first injection when less than 100 per cent. of the injected amount was excreted. Repeating the injections we noted a gradual reduction in the amount excreted, but no consistent absence of lactose from the urine. By suitable experiments on dogs it could be demonstrated that the lactose after intravenous injection was excreted not only by the urine, but also in the bile and by the duodenal mucosa, so that it is readily conceivable that instead of an increased destruction of lactose within the body, as shown by the urinary findings, a larger per cent. of it was shunted into the intestinal canal. We are at present engaged in experiments along this line and hope to be able to report on them at some future time. At this time, however, it is apparent that absence from the urine after injection is no indication that lactose is destroyed in the body.

I have come now to the part which will be of more interest to most of those present, namely, the bearing that all this has on the great question of the reduction of infant mortality. I have tried to show you that the commonest type of gastrointestinal trouble is caused directly by the food; that it is brought on in its most acute form by the lowering or overstepping of the tolerance for sugar, be that by improper feeding, by infection, by spoiled milk, by high external temperature, or by other causes. The food which, under normal conditions, nourishes the child, becomes a poison as fatal as bacterial toxins.

As I mentioned before, the purity of the milk, though of great importance, is not the only important factor. The emphasis that is being laid upon pasteurization of a city's milk supply, while it is of great value and, if properly understood, leads to much good, has, unfortunately, overshot the mark among the uneducated. Instead of feeding their infants fresh milk they avoid the bacteria entirely by giving them proprietary foods, with the dire results that one sees in dispensary work. This concentration on the bacteria of the milk has left the equally important factor of the quantity and character of the food entirely out of account. It was my good fortune to substitute for one of the physicians during July at one of the Berlin Säuglingsfürsorgestellen. I was impressed by one thing in particular—the good results that can be obtained by simple, home-made gruel dilution of milk in a class of people who have no ice-chests and

who live under poor hygienic conditions. Milk was supplied only once a day, so the bacterial content of the milk must, in most instances, have been high. And still the children did well. Why? Because they were carefully watched and weighed, and their food was always kept within the tolerance limit. Only in exceptional instances was a special food prepared in the milk kitchen of this capital fürsorgestelle. The mothers were taught how to make the milk dilutions by a nurse, who visited each new case; and so the movement is gradually educating a large part of the population to rational ideas of feeding and hygiene.

How many mothers do you suppose there are in America to-day who realize the danger that lurks in the sugar which they so generously add to the milk? How many doctors are there who appreciate this fact? How many doctors are there who will tell a mother to stop nursing her child with no other indication than the fact that the first few drops of milk expressed from the breast are blue? We see this in the dispensary only too often. This corner-stone of infant feeding is lightly set aside, not by one, but by a large percentage of physicians, who will take a child from the breast for the most trivial reasons. As regards his advice to mothers on feeding infants, it will depend largely on who sent him the last sample of proprietary food.

What we need is education of the doctor primarily, and, by him, the education of the public. We need to cull the scientific and clinical facts from the mass of empiricism of infant feeding, so that they can be presented to the physicians in a form that will be useful to him, so that he may appreciate the dangers as well as the therapeutic advantages of the different elements of the milk. What we need is capable supervision of each milk station by men who can make each station a center from which the propaganda of rational feeding and therapy will spread, so that ignorance will keep no infant from the breast, so that ignorance will no longer prevent the institution of the right therapy when there is still hope to save the child.

In conclusion let me repeat once more that I appreciate as much as anyone the advantages and necessity of pure milk of low bacterial content for infant feeding. On the other hand, of equal importance is the appreciation that improper dosage of even the purest milk is a serious danger to the life of the infant.

15 East Washington Street.

TAXIS AND SUCCUSSION. A NEW TREATMENT OF INTUSSUSCEPTION.

BY JOHN ZAHORSKY, M.D.,
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Under the above title (*Interstate Medical Journal*, Vol. XVII., No. 2, 1910) I described a new method of treating intussusception which I used successfully in 2 cases. I will quote from the former article.

"The treatment of intussusception before the advent of aseptic surgery may be learned from an article by Pilz (*Jahrb. f. Kinderhk.*, 1870). He reported the results of various forms of treatment in 162 cases, of which 35 recovered and 129 died, showing a recovery rate of 20 per cent. Eight of these cases were cured by means of the rectal inflation of air, 8 by the rectal injection of water, and 5 by the use of the rectal sound. This author rejected the older methods of treatment by calomel and metallic mercury. He found no benefit from the internal administration of sweet oil, opium and other medicaments. He advocated the use of physical methods and laid special emphasis on the rectal insufflation of air, a procedure that dates back to Hippocrates. The rectal injection of water was also commended, and he reported a few striking results. The rectal sound or tube was given a place in the armamentarium for reducing an invagination. He advised that the tip of an ordinary esophageal sound should be protected by a small sponge and this carefully pushed up the rectum. Only 2 cases had been treated by laparotomy at that time and both died."

"In the prize essay on intussusception by Guthrie (*Practitioner*, 1906), the modern method of treatment and results are given. From 1875 to 1877, at St. Thomas's Hospital, the rate of recoveries was about 25 per cent. From various sources it is learned that under prompt treatment by surgical operation the rate of recoveries has increased to 40 or 50 per cent. He advocates prompt operation as soon as the diagnosis is made, and deprecates all attempts at mechanical reduction of the invagination.

The English surgeons especially have originated and improved this surgical treatment, and the rate of recoveries in experienced hands has gradually increased. Clubbe, of Sidney, in his last 50 cases saved 38. (*British Medical Journal*, January 17, 1905.)

Similar results were obtained by Cole, of Melbourne. Clubbe states that the rectal injections of warm oil or saline solution does away with the necessity of operation in 10 per cent. of the cases. Cole contrasts his rate of recoveries (73 per cent.) with that by rectal injections (46 per cent.).

"The study of the results given by different authorities show that a mortality of 50 per cent. may be expected. Holt gives the mortality about 40 per cent. on the first and second days; after this time the death rate is very high.

"The high mortality of the operation in infants and the consequent anxiety caused to parents by removal to the hospital and several days of waiting, makes physicians hesitate to recommend the early laparotomy as long as there is a possible reduction by mechanical means. Clubbe succeeds only in 10 per cent. of the cases in reducing the invagination by the rectal injection of oil or saline solution. This contrasts rather sharply with the results of Hirschsprung (*Mitt. Grenz. Med. u. Chirurg.*, 1905), who reported over 100 cases, between 50 and 60 per cent. of which were cured by mechanical means."

The success of these mechanical procedures seems to vary greatly in the hands of different men, so that it is difficult to estimate the actual value of different methods. Fitz reports 33 cases out of 44 successful; while Wiggins had 33 failures in 39 cases. Barker failed to reduce the intussusception in every one of his cases by the rectal injection of water. Hand recently reported a successful case. In the study of these cases one is impressed by the fact that the technic used by different physicians is not the same and may in a great measure account for the difference in results.

It seems that the treatment by rectal injections is made more effective by the use of external manipulation or taxis. The signal success of Hirschsprung depends on the use of chloroform, rectal injection and taxis. While it is probable that he and his assistants have acquired a skill not possessed by the average practitioner, his success must necessarily dampen the practitioner's enthusiasm for prompt surgical intervention.

It is necessary to emphasize taxis as a valuable adjunct to the rectal injections for the reduction of an intussusception. Guthrie, in the prize essay mentioned, declares that "external manipulation alone is scarcely worthy of consideration." Nevertheless, five of Hirschsprung's cases were reduced by this means alone. My own

limited experience corroborates its extreme usefulness, and it should always be employed with water injections.

Two years ago I devised a mechanical method of treatment which has served me well in 2 cases, and to which I desire again to call attention at this time. I call it the "combined taxis and succussion method."

The technic is as follows:—

The little patient is anesthetized with chloroform or ether by an assistant. The abdomen is bared, and a small pillow should be placed under the hips. The tumor is grasped through the abdominal wall and firmly compressed for a few moments in order to reduce the swelling to some extent, since it is the hyperemia and edema that prevents reduction. Then the thighs are flexed on the abdomen, the knees or legs grasped, and with a rapid up and down movement the lower part of the trunk is vigorously shaken for several seconds. Then the tumor is grasped again and compressed, and while pushed against any part of the posterior abdominal wall the fingers push, or strip, the intussusciens out of the intussusceptum. The fingers at the same time should make a trembling motion which assists in the reduction. After a few moments of taxis the succussion is again resumed. The efforts of taxis and succussion follow each other alternately. The succussion method may be assisted by the presence of some water in the transverse colon, which should be injected if reduction does not occur promptly.

Sometimes, on account of the mobility of the mass, it is impossible to use taxis effectively and reliance must be placed entirely on the succussion or shaking.

That this shaking does do the work is evident by the fact that in all of my cases the tumors disappeared while the shaking was being done, although taxis had very much diminished the size of the swelling. The sudden jarring may loosen adhesions, but there is another explanation which I believe is the true one. To make this clear it is necessary to recall that the abdominal cavity has a high ridge running throughout its length when the child lies on its back. From this ridge, the spinal column, a marked declivity extends on each side. When any downward movement is suddenly arrested the resulting force is strongly outward. If the invaginated mass is situated near the median line the afferent and efferent parts of the intestine have a tendency to go away from the center and thus pull the invagination apart. This is

especially true if the tumor lies in the region of the transverse colon, which is the most common position.

The succussion may be varied according to the conditions present. The infant's pelvis may be grasped and sharp jerks made to throw the mass forward toward the anterior abdominal wall and its greater momentum tend to separate the invaginated parts.

I have used this method successfully in 3 successive cases of intussusception. I am firmly convinced that it has an important place in the therapy of this disease. The procedure is simple and harmless. Surgical means may be instituted if this method fails. I would recommend two or three trials of fifteen minutes each at intervals of two or three hours.

Of course, this procedure has its limitations. Success is probable only in early cases, hence the diagnosis should be promptly made. After twenty-four to forty-eight hours in acute cases the swelling will be so great and the local constriction so tight as to render reduction impossible by this method. In cases depending on some foreign body or abnormal growth success is very unlikely.

REPORT OF CASES.

CASE I. This was a boy four years of age who for several weeks had recurrent attacks of abdominal pain and vomiting. There was no history of injury, no evidence of a digestive disturbance. The boy had always been healthy, except a gastro-enteric disturbance in infancy. On examination a sausage-shaped tumor was found lying above the umbilicus transversely across the abdomen. This mass was movable in every direction. Although there had been no bloody stools and no absolute constipation, the severe paroxysmal pains and the elongated characteristic tumor suggested intussusception. He was removed to the Bethesda Hospital, and, assisted by Dr. W. L. Johnson, the method as described was employed to reduce the invagination. After twenty minutes' work the tumor entirely disappeared. The boy has had no further disturbance, although more than two years have elapsed.

In this case I practiced the up and down motion after compression of the mass. Taxis was not successful on account of the mobility of the tumor. The child was anesthetized, and, while lying on his back, the lower part of his trunk was vigorously shaken up and down, taking care to arrest the downward motion

abruptly. The reduction in this case must be attributed entirely to the succussion.

CASE II. E. G., male, aged eight months, was first seen by Dr. Albert Taussig. The infant was suffering from severe recurrent pains and vomiting. Several hours after the onset of the illness he passed a large amount of blood. The bowels were obstinately constipated. A sausage-shaped mass was found on the right side in the region of the ascending colon. Dr. Taussig attempted to reduce the invagination by the rectal injection of water. The size of the tumor very much diminished and the infant felt relieved for several hours. Then the pains returned and the infant again passed some blood. Dr. Taussig asked me to examine the infant and assist in deciding the serious question of operation.

The infant was anesthetized, placed on its back and the tumor quickly made to disappear by a combination of succussion and taxis. There was no further trouble and no recurrence after one year and a half.

In this case, the tumor being long and not very movable, the succussion was materially assisted by taxis; that is, the tumor was stripped downward while the fingers at the same time made a trembling motion.

These 2 cases were referred to in my first report, which was made before the St. Louis Medical Society in the fall of 1909.

CASE III. This male infant was seven months old, breast-fed, and was first seen by Dr. Youngman. The infant had severe vomiting and repeated attacks of crying. Dr. Youngman thought the symptoms indicated acute indigestion and prescribed castor oil and calomel, but no evacuation of the bowels could be obtained, even after a high enema. There was no passage of blood and mucus. After forty-eight hours Dr. Amerland was asked to see the child and found a tumor to the right of the umbilicus, and the physicians decided that an intussusception was present.

The infant was removed to St. Anthony's Hospital, and I was asked to see the patient and to make an attempt to reduce the invagination. Dr. W. J. Miller was present ready to perform a laparotomy if the succussion method failed.

After the infant was anesthetized a tumor about the size of a walnut was readily made out, lying to the right of the umbilicus. It was freely movable in every direction and taxis was not easily performed. After compressing the mass for a few seconds the

infant was turned on the left side and a few quick jerking movements were made downward and laterally, with the object of throwing the mass outward. I had hardly commenced the movement when a gurgle was heard and the mass could no longer be found. Fifteen minutes later, while the infant was still under partial anesthesia, a large liquid fecal evacuation with a loud report demonstrated that the obstruction was removed. The infant has remained perfectly well.

These cases have convinced me that in succussion carefully used we have a powerful means of reducing intussusception.

1460 S. Grand Avenue.

LOBAR PNEUMONIA SIMULATING APPENDICITIS.—Bennecke (*Mediz. Klinik.*, No. 7) reports an interesting case. A boy, ten years old, with high fever and the signs of appendicitis, was operated upon but the appendix found normal. The fever continued, and several days after the operation a typical pneumonia developed, affecting the left upper lobe, and running the usual course. He was able to find in the records of the Jena medical clinic the histories of 21 cases of pneumonia, which at first presented the typical picture of appendicitis or of general peritonitis. Their subsequent course proved that there was no real peritoneal involvement. Pneumonias of the right upper lobe seem chiefly to dispose to this symptom-complex, which is most commonly found in children.—*Interstate Medical Journal*.

USEFULNESS OF OPIATES AND THEIR HARMLESSNESS IN CHILDREN.—Lust (*Ann. de Méd. et Chir. Inf.*, November 1, 1909) says that opiates are not contraindicated in infants, as has been supposed, but, on the contrary, are of great value in spasmodic conditions. We should avoid preparations of opium which contain all the alkaloids and other principles of the drug, and should confine ourselves to morphin given hypodermically or by mouth. The tolerance of infants for this drug is equal to, or greater than, that of adults if its dosage is based not upon age but upon weight. Morphin is a simple, stable product, the dosage of which can be given with precision. It should be one-half milligram for every kilogram of weight in each twenty-four hours, well diluted, or one-half as much by hypodermic injection. There is no fear of accumulation, and the dose may be increased without fear.—*American Journal of Obstetrics*.

SOCIETY REPORTS.

THE NEW ENGLAND PEDIATRIC SOCIETY.

Fourteenth Meeting held Saturday, February 25, 1911.

JOHN LOVETT MORSE, M.D., PRESIDENT.

The following papers were read:

THE TRANSFUSION OF INFANTS WITH GLASS TUBES.

DR. BETH VINCENT, who read this paper, said: The paper describes in detail the preparation and use of coated glass tubes in transfusing infants. The technique is based on experimental work carried out in the Laboratory of Surgical Research, Harvard Medical School. Tubes 12 cm. in length and 3 in diameter at the ends are practical for the average newborn baby. The coating material consists of a mixture of vaselin, paraffin and stearin in 2, 2 and 1 proportions. The paper includes the report of 3 cases successfully transfused by this method. In 1 case the transfusion was done for postoperative hemorrhage; in the other 2 for hemorrhagic disease of the newborn.

DR. LUCAS.—One point which I think should be brought out is the importance in doing an operation like this of being acquainted with the experimental side of it, because I do not think that where one has not done the operation he can realize the minuteness and care which an operation of this kind requires.

DR. PUTNAM.—I would like to have Dr. Vincent tell us if he has any idea as to the amount of air which entered into the artery of the baby. It used to be held that even the smallest amount of air in a hypodermic syringe could cause an embolism. Also does he know what amount of heat is necessary to sterilize these tubes by this method, and whether the boiling of the wax would be considered sufficient? We must agree that the observations and operations reported in his paper are of the greatest interest.

DR. RISLEY.—I would like to ask Dr. Vincent if he had any difficulty in using a tube which was straight and not flexible, because about a year ago I was doing some transfusion work and

was attracted by an article by some New York men, in which they described a preparation of carotid arteries of dogs. They took the small arteries out, strung them on two Crile canulas and straightened them out by means of a small silver wire and then preserved them in a weak 2 per cent. formalin solution and used them from time to time in transfusion. The preparation was very simple, and they could be used as long as three or four weeks after preparation. They worked pretty well, with the exception that the Crile canulas were most of them a little too large to accommodate the small carotid arteries of the dogs. This gave an extra length and the tube was a little bit flexible. If the tube is bent too much the blood flow would not be as good. I wonder if Dr. Vincent found any difficulty because the tubes were straight?

DR. QUINBY.—It has been a great pleasure to have been able to help in a small way in this very interesting work of Dr. Vincent. It has convinced me thoroughly that from a practical surgical standpoint there is no other mechanical apparatus which will permit, with any fair chance of success, transfusion from the adult to a baby. The Crile and Elsberg apparatus are both inadequate, and, even if one is exceedingly skillful in their use, I should say that the chances of success are relatively small; whereas with the tube method which Dr. Vincent has used the chances are distinctly in favor of a successful transfusion. Even when the procedure is made more easy by the use of tubes, experience and practice on animals is necessary in order to acquire familiarity with a method as minute as is this. Not only are the babies' vessels small, but they are in a position, such as the groin, which makes them very difficult to get at. I think that Dr. Vincent's work is especially commendable in having made transfusion, which we all know to be of value, also practical.

DR. VINCENT.—I should think that there would be distinct advantage in using the flexible tube, but the chance to do these transfusions came in my experience at longer intervals than six weeks, and you have to have something to be practical surgically, that is, always available. I dare say that one who does a great many transfusions might be aided by their use. The greatest difficulty is in getting the tube into the small veins. We generally expect to unite the tube to the father's artery without much difficulty.

As far as the entrance of air was concerned, in the laboratory we disregarded it a great deal and did not have any trouble. The tube is very small and I do not imagine that it contains air. This is a point which I knew, from a surgical point of view, would be criticised, so I always fill them with salt solution.

In regard to sterilization of the tube, it has been heated a great many times. Many of the tubes are not taken out of the box at all, and I am sure that the heat is sufficient to sterilize them, but I am not perfectly sure just what the temperature is, but in boiling I know that the temperature is carried above the boiling point of water.

DR. B. L. ARMS read a paper entitled

PUBLIC HEALTH LABORATORY,

in which he brought to the attention of the Society the large scope of the work being done at the City Bacteriological Laboratory, and showed wherein the practitioners might use the laboratory even more than they are doing at present.

DR. DENNY.—I have been very much interested for the past twelve years in the problems to which Dr. Arms has referred, through my work in the Brookline Board of Health Laboratory, and there is just one matter in regard to the diagnosis of diphtheria that I should like to speak on. In a small laboratory, where I personally know most of the physicians who send in the cultures, I hear more or less of the clinical side of the cases, and I see a fairly large proportion of the cases myself at the Board of Health Hospital. This has enabled me to get a fairly definite idea of the relation of the bacteriologic diagnosis to the subsequent course of the disease. This experience has impressed on me the vital importance of making an early diagnosis and of giving antitoxin early. Some of the physicians always make cultures in suspicious cases and often give antitoxin without waiting for a report from the culture. As a result, they seldom have a serious or fatal case, unless the parent has neglected to call them in early. On the other hand, I regret to say, we see cases where the physician is called and makes no culture at his first visit. On the second day, as the case is then typical clinically, he makes the culture but waits for a report before giving antitoxin, and then often gives too small an amount to be effective at that period. Diphtheria is one of the few common medical diseases where

promptness in diagnosis and treatment are vitally important. In many acute diseases delay in diagnosis is of little consequence, provided we keep the patient in bed. In this disease the responsibility of the physician is very great.

DR. MORSE.—I should like to ask Dr. Arms just what the Board of Health is doing; how many different sorts of examinations they make, and how large a field they cover. In the examination of the sputum do you examine for anything beside tubercle bacilli?

DR. ARMS.—For the eleven months ending December 31st, we examined about 15,000 throat cultures and slightly over 5,000 sputa, just over 2,000 typhoids, 191 smears from the eyes, 968 smears from the urethra, 340 glanders, 10 rabies, besides a good many other examinations classed under miscellaneous tests. In the sputum examinations we do not look for other organisms unless requested, although if streptococci are present this fact is reported.

DRS. ARTHUR I. KENDALL and RICHARD M. SMITH read a paper entitled

DIARRHEA IN INFANTS ASSOCIATED WITH THE PRESENCE OF THE
GAS BACILLUS IN THE STOOLS.

The writers concluded that apparently there exists a group of diarrhea in infants impossible to differentiate clinically from infectious diarrhea caused by the dysentery bacillus. These cases are associated with the presence of large numbers of gas bacilli in the stools. The bacilli occur in such numbers and in such relations that it seems reasonable to believe that they are the etiologic factor of the diarrhea. A simple method for detecting the presence of gas bacilli in the stools has been described by means of which it is possible within twenty-four hours to make a definite diagnosis of diarrhea caused by the gas bacillus. This diagnosis when made gives the indication for treatment with buttermilk. In the application of this method and the differentiation of this group of cases, due to the gas bacilli, a distinct advantage has been made in the diagnosis of diarrhea in infants.

DR. TOWNSEND.—With regard to the gas bacillus, is there anything whatever that you can detect about the stools or symptoms that differs from those of the ordinary infectious diarrheas?

DR. MORSE.—After listening to this interesting paper there are

a few questions which I should like to ask. In the first place, Was the buttermilk which was used last summer in the treatment of these cases pasteurized or unpasteurized? To what do you attribute the action of the buttermilk: to a direct antagonistic action of the bacteria in the buttermilk on the gas bacillus, to the high acidity of the buttermilk, or to the fact that they are both organisms which live on sugars and that the lactic acid bacilli destroy the media so the gas bacillus cannot grow?

In giving the so-called buttermilk, I suppose it really was buttermilk which was made from skim milk, which consequently had a very low fat content, a moderate sugar and high proteid, the proteids being very finely divided. Now the question comes to my mind, whether the low fat and rather low sugar content of the food may not have had something to do with its action.

DR. ROTCH.—I think that this is a very important communication, and one that marks a decided advance in regard to diagnosis and treatment. I only hope that what has been stated will prove to be correct. I think it would be well not to simply speak of buttermilk in the treatment, but to state the special strain through which the buttermilk is produced. We know that there are a very large number of strains which will produce buttermilk, but perhaps only certain ones which may have a specific action on the bacilli producing the disease, such as has been indicated by Dr. Kendall. I merely mention this because a good many physicians have found that they have gotten no results whatever from the use of buttermilk. Now that we can pick out at least one organism which is affected by its use, we may go on and find others which will be affected in the same way.

It may, of course, eventually be proved that it is not an especial lactic acid bacillus which has a specific action on certain saprophytes, but that it is the acid medium produced by the bacilli which inhibits the special organism which is producing the intestinal disturbance.

DR. TALBOT.—This piece of work is of vast importance, because it puts the treatment of the disease that we see so much of in the summer on a very definite and practical basis. This work and the work that was done on the dysentery bacillus is very interesting, because it does not agree with what we are taught by the German schools.

DR. SMITH.—I only want to reiterate what has already been

said about the simplicity of the test. It takes no time to make the media up, the interpretation is extremely simple, and there seems no reason why it should not have a very wide application. It is only necessary to boil a little sterilized milk in a test tube, to which has been added some fecal matter, and at the end of twenty-four hours look at it to see if the characteristic reaction is present.

DR. KENDALL (in closing).—I would like to say a word or two about the buttermilk which is now being placed on the market. Much of the ordinary buttermilk as it is delivered to the consumer consists of milk which has passed its usefulness, which has been sent back to the factory, pasteurized, lactic acid bacilli added and churned. After the removal of the butter fat it is reintroduced to the trade under the guise of buttermilk. In addition to the lactic acid bacilli, which are supposed to be the principal agents, it also contains large numbers of putrefactive bacteria. These putrefactive bacteria may be so numerous that they actually overgrow the lactic acid organisms, and, instead of obtaining sour milk, one gets putrid milk. Buttermilk intended for therapeutic purposes ought not to be prepared in this way, but should be milk which is soured at the earliest possible moment and then introduced to the trade. Experience has shown that pasteurization does not necessarily kill the putrefactive organisms, and in the old milk referred to the subsequent introduction of lactic acid bacteria may actually fail to bring about the desired reaction in many instances.

The buttermilk used on the Floating Hospital was prepared by the Walker-Gordon Laboratory and was unpasteurized and contained the bacillus *Bulgaricus*.

There is apparently a distinct advantage in using buttermilk prepared by the method described in these cases of diarrhea caused by the gas bacillus. By using this soured milk it is possible to introduce immediately into the intestinal canal a certain amount of preformed lactic acid, together with bacteria, which can act upon the residual lactose of the buttermilk, thus maintaining a steady stream of lactic acid in the intestinal tract. We know that lactic acid is burned in the body, and if one relied exclusively upon the lactic acid present in the milk at the time of its administration, it is problematical how much lactic acid would be left by the time the milk reached the site of bacterial activity. By introducing,

together with the lactose, these lactic acid bacilli, we have, in a measure, a guarantee that the lactic acid will be maintained in at least a moderate concentration until the normal intestinal lactic organism can proliferate sufficiently.

The test consists of inoculating sterile whole milk with a small amount of the fecal material, and either heating the resulting mixture to 80°C. for twenty minutes, or bringing the mixture to the boiling point of water in a water bath and maintaining it at this temperature for three minutes. If sterile whole milk is not available in emergencies, the test can be made by using certified milk instead of a sterile milk. Ordinary market milk would be unsuitable for this test unless it were sterilized, because not infrequently such milk contains gas bacilli. It must be apparent that the most reliable results will be obtained through the use of sterile milk.

There are a great many different strains of lactic acid bacilli in use at the present time for preparing sour milk. Certain of these organisms, and notably the bacillus *Bulgaricus*, have been grown in milk so long that they have actually become what might be termed milk bacteria. Furthermore, these organisms have been used for generations in certain Oriental countries for the production of sour milk for human consumption, and it is fair to assume that the use of these organisms prescribed rationally would probably lead to no harm. On the other hand, the mere fact that an organism produces lactic acid is no guarantee that it would be a useful one for introduction into the intestinal tract, and it would seem that the careless use of cultures which have not been subjected to careful scrutiny to determine their fitness for therapeutic purposes is to be deplored. Experience in the past has shown that buttermilk is of benefit only in a rather limited and probably circumscribed type of intestinal disturbance. Buttermilk cannot by any means be regarded as a universal therapeutic agent.

THE EARLY DIAGNOSIS AND PROPHYLAXIS OF PULMONARY HEMORRHAGE.—Mueller (*Wien. med. Woch.*, 1910, No. 29) has found that hemoptysis is almost invariably preceded for several weeks by a distinct rise in blood-pressure. Whenever such a rise occurs in tuberculosis he believes a hemorrhage is to be feared. His prophylaxis consists of rest with the administration of digitalis and morphin.—*Interstate Medical Journal*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. CHARLES E. FARR.

DR. FRITZ B. TALBOT.

DR. M. C. PEASE, JR.

DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

KOPETZKY, S. J.: THE PRESENT STATUS OF LABYRINTHINE SURGERY. (*Annals of Otology, Rhinology and Laryngology*, December, 1910, p. 994.)

In a citation of 7 cases there were 3 in children under two years old. The classification divides the disease into five groups:—

(1) Infectious labyrinthitis as sequela of acute middle ear disease.

(2) Infectious labyrinthitis as sequela of acute exacerbation of chronic middle ear disease.

(3) Traumatic labyrinthitis (hemorrhagic and infectious).

(4) Infectious labyrinthitis following chronic middle ear disease (without acute exacerbation).

(5) Chronic labyrinthitis.

Under (1) the symptoms advance so rapidly that the meningeal involvement masks the ear lesion. There is a sudden appearance of facial paralysis, associated with a rapid rise of temperature. The author states that the treatment here should be palliative, for, without more definite signs and with the involvement of the meninges, the hearing apparatus should be preserved when possible, and the mortality is very high as it is. Though spontaneous nystagmus is a significant symptom, it often comes on too late to be of use. Absolute rest in bed for three weeks seems to be the best treatment.

S. W. THURBER.

VOLK, MAXWELL L.: ADENOIDS AS A HINDRANCE TO THE PROPER DEVELOPMENT OF THE CHILD. (*Medical Review of Reviews*, January, 1911.)

The principal value of Volk's article lies in his tabulated statistics of over 3,000 school children. Of these, 671 showed unmistakable signs of adenoids, accompanied in 400 cases by enlarged tonsils. Anemia was marked in 12 cases, and in 10 cases tuber-

cular cervical lymph nodes were present. A careful examination was made of 88 delinquent children; adenoids were present in 64 cases, or 73 per cent., compared to less than 30 per cent. in the total number examined. Most of them showed delinquency in years and poor physique along with stupid appearance, incorrigible behavior, deafness, etc. Adenoids are thus seen to lower the child's vitality and prevent its proper development of body and mind.

CHARLES E. FARR.

SURGERY.

FEUTELAIS, DR. PASCAL: TRAITEMENT CHIRURGICAL ET ORTHOPÉDIQUE DE LA MALADIE DE LITTLE. (Bordeaux, 1910.)

This hundred page monograph on spastic paraplegia presents an excellent study of the symptomatology, avoiding the etiologic factor for the most part. The author's definition for the disease is congenital spastic rigidity of the limbs, the title given by Little. The tendency of the disease is toward spontaneous improvement, except in the idiotic type, in which very little can be accomplished by any method. The principles of the treatment as outlined by Feutelaïs are the prevention and correction of the deformity and the education of the muscles. The orthopedic and surgical measures used are all well known. Severe operations, such as section of the spinal roots, should be reserved for the extreme cases. Alcohol injection and discission of the peripheral nerves are not considered. The greatest stress is laid upon persistence in simple orthopedic measures. The results are excellent in the milder type of cases and fair in even the more severe cases. Feutelaïs reports 5 personal cases.

CHARLES E. FARR.

FREDET AND GUILLEMOT: HYPERTROPHIC STENOSIS OF THE PYLORUS IN INFANTS. (*La Sténose du pylore, par hypertrophie musculaire, présenté au sixième Congrès de Gynécologie, d'Obstétrique et de Pédiatrie tenu à Toulouse en Septembre, 1910.*)

The authors, after giving a very careful historical review of the subject, in which they credit the first reported case to Beardsley, of New Haven, in 1788, proceed to discuss the causes and symptoms. They believe that the underlying condition is a congenital hypertrophy of the circular muscle fibers of the pylorus, of unknown origin, and that the inflammatory changes occa-

sionally seen are either secondary or superadded. Curiously enough, there seems to be a predisposition to this condition in the Anglo-Saxon race. There is a family tendency also and the great majority of cases are in males.

Vomiting, the most prominent of all the symptoms, appears usually after a short free interval, generally two to three weeks, and is frequent, small in amount, and explosive in character. It never contains bile. Dilatation of greater or less degree quickly follows in most cases, along with visible peristalsis. Constipation is obstinate, and the patient loses weight rapidly. Occasionally a tumor can be felt. Secondary symptoms are hyperacidity, enteritis and oliguria. The infants die of inanition or secondary infection.

The pathology and pathogenesis are very carefully discussed. Cases of pylorospasm are distinguished from those of true stenosis. Medical and surgical treatment is given in detail. Posterior gastroenterostomy is the operation of choice in cases which resist careful medical treatment. The mortality in operated cases, now about 40 per cent., is improving steadily. The late results are always good.

CHARLES E. FARR.

WRIGHT, G. A.: USE OF ELASTIC TRACTION AND ELASTIC PRESSURE IN SURGERY. (*British Medical Journal*, November 26, 1910.)

Wright recommends the use of rubber cords and bands for the correction and prevention of deformities. The treatment is very simple, requiring only a little ingenuity and moderate care to prevent pressure sores. The principle of Wright's method is the replacement of cumbersome and expensive steel springs, plates, etc., by simple straight splints, with the elastic traction applied over the affected part in such a way as to produce moderate but steady compression or traction as desired.

CHARLES E. FARR.

COMBY: CHRONIC APPENDICULAR DISEASE IN CHILDREN. (*Archiv. de Med. des Enf.*, June, 1910; reviewed in the *New York Medical Journal* February 25, 1911.)

The author concludes that an acute inflammation is nearly always preceded by a chronic one, which is very common in children. The attack often follows gastroenteritis, and the patient fre-

quently has adenoids and hypertrophied tonsils. Meat diet and the infectious diseases favor chronic inflammation. This is rare in infancy, but becomes more frequent from the fourth year onward. The appendix will be found swollen, deformed and adherent, with partial or complete obliteration of its lumen. The diagnosis is at times quite difficult, as the symptoms vary a great deal. There is usually loss of flesh and constipation, and occasionally paroxysmal vomiting. Pain and distention are unusual, and the diagnosis must be made largely by exclusion. Operation is, of course, the only safe treatment. CHARLES E. FARR.

ADAMS, J. E.: THE CLINICAL ASPECT OF INTUSSUSCEPTION. (*The Practitioner*, 1910, Vol. LXXXV., p. 697.)

J. E. Adams reports 100 cases treated at St. Thomas' Hospital during eight years. Seventy per cent. of the cases were in infants under one year. There were 10 enteric, 16 colic, and 73 enterocolic. Polyp or tumor of the intestine may be an important cause. The cardinal symptoms are pain, present in 92 per cent.; vomiting, 90 per cent.; bloody stools, 92 per cent. Diarrhea was seen in 13 per cent., and constipation in 33 per cent. In 27 cases a tumor was felt per rectum. Ninety-one cases operated upon gave a mortality of 35 per cent., due largely to shock. As usual, the mortality was much less in cases operated on within the first twenty-four hours. CHARLES E. FARR.

ROGERS, CASSIUS C.: INTRACRANIAL SURGICAL LESIONS IN CHILDREN. (*Journal of the American Medical Association*, March 4, 1911.)

Rogers pleads for more promptness in the diagnosis and surgical treatment of intracranial lesions before irretrievable injury has been done to the brain. With delayed operations only partial recoveries or palliation of symptoms can be expected. Too much time is wasted with the iodid treatment. Even in the luetic cases there may be no improvement until the intracranial pressure has been relieved by some form of decompression. Of the author's 16 reported cases there were 6 deaths—2 from shock, 1 each of pneumonia, meningitis, edema of brain and cerebellar tumor. Three cases were improved and 7 were cured. The author, however, points out that the cured cases may relapse years after the operation, and that to be sure of ultimate good results the operation must be performed before the epileptic habit is formed or the brain tissues are damaged beyond repair. CHARLES E. FARR.

MEDICINE.

BOWDITCH, HENRY I.: INFECTIOUS DIARRHEA: ITS TREATMENT, WITH ESPECIAL REFERENCE TO THE BIOCHEMICAL AND BACTERIOLOGIC STANDPOINT. (*Boston Medical and Surgical Journal*, March 2, 1911, p. 294.)

The writer concludes, when commenting on the chemical bearings of Dr. Kendall's paper, that "we have definitely found, as we rightly conjectured, that lactose in solution can be given earlier than was formerly considered. Under these conditions it certainly helps ingestion of liquids. We feel that it has a beneficial effect on dejecta. Lactose and dextrose in the irrigations gave no demonstrable therapeutic value. Dextrose infusions were certainly an improvement. While this bacteriologic study of movements in connection with bacillary dysentery has not added materially to our knowledge of treatment, it has explained the 'whys and wherefores' of our old empirical treatment."

FRITZ B. TALBOT.

MEINICKE, E.: DIE TUBERKULOSELITERATUR DER JAHRE 1906 UND 1907. (*Deutsch. Aers. Zeit.*, 1911, No. 2, p. 28.) .

A very good summary and synopsis of the literature of those years, part of which applies especially to infants and children.

FRITZ B. TALBOT.

PHYSIOLOGY.

HOWE, PAUL E., AND HAWK, P. B.: FASTING STUDIES: I. NITROGEN PARTITION AND PHYSIOLOGIC RESISTANCE AS INFLUENCED BY REPEATED FASTING. (*Journal American Chemical Society*, February, 1911, Vol. XXXIII., No. 2, p. 215.)

A fox terrier bitch, about one year old and weighing 3.41 kilograms, was brought into nitrogen equilibrium and was subjected to two fasts. On the fifteenth day of the first fast the pre-mortal rise in nitrogen output was noted and was accompanied by other signs indicating that death would result in a few hours. She was then carefully fed, and during the feeding period of forty-seven days regained her former weight and was again brought into nitrogen equilibrium, after which she was fasted a second time for a period of thirty days. The animal was in fully

as good physical condition at the beginning of the second as she was at the commencement of the first fast.

The water ingestion was uniform (250 c.c.) throughout the feeding and fasting periods. The loss in body weight was nearly equal in each fast, being 45.75 per cent. for the first, and 46.04 per cent. for the second fast. However, on the fifteenth day of the second fast, *i.e.*, after a period equalling in length the entire fast, the animal had lost but 25.42 per cent. of her body weight.

From the data obtained we have shown that:—

(1) With a practically equal total nitrogen excretion the rate of this excretion was widely different in the two fasts, being high and rapidly increasing during the first fast of fifteen days, and low and fairly constant during the second fast of thirty days. A premortal rise occurred at the end of each fast.

(2) The absolute amount of urea excreted was in direct relation to the total nitrogen excretion. The relative urea-nitrogen excretion remained practically constant throughout the fasts, but increased with an increased total nitrogen excretion during the intermediate feeding period.

(3) The ammonia-nitrogen excretion remained fairly constant, varying with the total nitrogen excretion in that when this was low the ammonia nitrogen was absolutely lower but relatively higher.

(4) The creatinin-nitrogen excretion decreased very uniformly and gradually as the fasts progressed, and increased uniformly and gradually during the intermediate feeding period. The total output of creatinin-nitrogen varied inversely as the length of the fast. On the nineteenth day of the feeding period, or at the time 34 per cent. of the body weight lost in the first fast, and one-fourth the nitrogen lost had been restored, the creatinin coefficient was nearly equal to that before the fast. Furthermore, on the twenty-fifth day, or at the time the animal had regained only 50 per cent. of its lost nitrogen and the body weight, the creatinin coefficient was the same as that secured before the fast, when the dog was of constant body weight and in nitrogen equilibrium.

(5) The total amount of creatinin nitrogen excreted was practically the same during each fast. The average daily amount of creatinin nitrogen, however, was nearly twice as great during the first fast as during the second fast.

(6) The allantoin and purine nitrogen excretions decreased as a result of the fast, and were practically equal.

(7) The undetermined nitrogen decreased as a result of fasting. The average daily amount of undetermined nitrogen in the second was one-half that in the first fast.

(8) A consideration of the summation of the nitrogen balances shows that there is a minimum amount of nitrogen which must be present in the body in order that life shall exist.

(9) The excretion of urinary creatin increased suddenly a few days before the drop in the total nitrogen excretion which precedes the premortal rise. From this time to the end of the fast the daily output of creatin nitrogen exceeded that of the creatinin nitrogen.

(10) Assuming the accuracy of the theory that the urinary creatin represents disintegrated muscular tissue and calculating accordingly, a discrepancy exists between the calculated mass of muscular tissue lost, when considered from the standpoint of total nitrogen and creatin nitrogen respectively. When all the facts in this connection are taken into consideration it is apparent that over 50 per cent. of the total nitrogen had a source other than the muscular tissue.

(11) The creatin content of muscle showed a marked decreased (over 60 per cent.) as a result of fasting, while the nitrogen content of similar muscle was but slightly lowered. This pronounced decrease of creatin found by us in fasting muscle is a most significant fact and shows clearly that in fasting we cannot with accuracy consider the total amount of excreted creatin as resulting from the complete and permanent disintegration of muscular tissue. It appears that the creatin of the urine is derived either from disintegrating muscular tissue or is removed in some manner from such tissues which are still functioning within the body.

(12) As a result of our experiments we have shown that in repeated fasting there is a slower and less profound tissue disintegration during the second fast, indicating a greater resistance of the body, acquired as a result of the initial fast. This increased resistance noted in our experiments following fasting may indicate that the "repeated fast," if properly regulated, may possess important therapeutic properties. The greater length of the second fast could not have been due to increased fat stores, for the fat present in the body of the animal at the beginning of the second fast was, according to our calculations, only 50 grams more than at the beginning of the first fast.

FRITZ B. TALBOT.

THERAPEUTICS.

MASON, N. F.: REPORT OF A CASE OF THE ADMINISTRATION OF A GRAIN OF MORPHIN TO A BABY TWO AND ONE-HALF DAYS OLD. RECOVERY. (*Boston Medical and Surgical Journal*, February 9, 1911, p. 190.)

This baby received at 9 P.M., October 8th, morphin sulphate by mouth and had the typical symptoms of morphin poisoning. The treatment used was as follows:—

October 8th, 11:15 P.M., wine of ipecac, min. xv; 11:45 P.M., sulphate of atropin, gr. $\frac{1}{350}$ s.c.

October 9th, 12:10 A.M., sulphate of strychnia, gr. $\frac{1}{240}$ s.c.; 12:45 A.M., brandy mxxx; 1:10 A.M., soap suppository; 1:30 A.M., suds and glycerin enema; 1:35 A.M., sulphate of atropin, gr. $\frac{1}{350}$; 2:15 A.M., black coffee, oz. iv, by rectum; 2:45 A.M., brandy mxxx; 3:25 A.M., brandy m. x; 4:15 A.M., brandy miii; 6:00 A.M., sulphate of strychnia, gr. $\frac{1}{240}$; 7:15 A.M., brandy miii; 7:30 A.M., castor oil, oz. i.

The above treatment is of interest in view of the fact that the baby recovered.

Fritz B. Talbot.

CHAPIN, H. D.: TREATMENT OF CONGENITAL SYPHILIS BY THE ADMINISTRATION OF 606 (SALVARSAN) TO THE NURSING MOTHER. (*American Journal of Obstetrics and Diseases of Women and Children*, February, 1911, p. 335.)

Dr. Chapin in this article reviews the literature of cases treated in a similar way. He finds in all 2 such cases in which the results were favorable and one in which there was no improvement in the child.

His own case was a congenital syphilitic child that had had treatment with mercury. Both mother and child gave a positive Wassermann-Noguchi reaction. The mother was given 0.4 of a gram of 606. Seven days after the injection both mother and child gave a negative Wassermann-Noguchi reaction. The mother felt better than she had in a long time. The child showed no symptoms of syphilis. There was no arsenic in the milk of the mother. In spite of this the child rapidly became atrophic. Examinations of the mother's milk showed that it was normal as regards fats and total solids. There seemed to be no lack as regards quantity. Twenty-five days after the injection the baby died. The baby was a Mongolian idiot, which may have influenced its vitality and helped toward the final result. M. C. PEASE, JR.

ARCHIVES OF PEDIATRICS

JUNE, 1911.

ROYAL STORRS HAYNES, PH.B., M.D.,

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

THE SUMMER OUTLOOK.

During the next four months the two diseases which will occupy us most, as physicians dealing with the diseases of children, are dysentery and poliomyelitis. The former, our ancient enemy, is sure to be here soon, stalking with its old-time arrogance which no labor of the many physicians and nurses and health boards has yet been able to effectually curb, and bearing away innumerable little ones to constitute the death rate it yearly demands. The latter, less mortal, but none the less dreadful, we await with anxious uncertainty, not knowing where, how soon, or how severe its visitation will be.

The treatment of the diarrhea of summer has gradually undergone a change toward simplicity and, we believe, toward sense. Time was when the treatment consisted of astringent drugs and opium; milk was allowed; bismuth was in vogue. Gradually the giving of milk during the acute stage has declined in favor, and now even the proprietary food advertisements say in a case of diarrhea to stop milk. The advocates of gruels in diarrhea knew that they did better than a milk diet long before it was realized that the organisms of dysentery group elaborated their specific toxins best upon proteid food in the absence of carbohydrate or in the presence of very low carbohydrate; that with adequate carbohydrate regimen their growth was inhibited; such of them as could acquired a fermentative action and the distinctively fermentative bacteria, the antagonists of the putrefactives, took on a more luxuriant growth. Upon this basis stoppage of the milk and the feeding of carbohydrate in the form of lactose or cereal gruels is indicated therapeutically, after a thorough cleaning out with castor oil and irrigations. Astringents play a minor part. Bismuth seems to help some. Silver nitrate irrigations may have a field. The main reliance must be placed upon cleaning out the alimentary tract, fresh air, clean bodies, water for the tissues, either by mouth or hypodermoclysis, and carbohydrates for calories and for fermentation. Stimulation will undoubtedly be required at times. Beyond this not much.

After all, it is in the prevention of summer diarrhea that most of our hope lies. The instruction of mothers in the necessity for breast feeding, in the care of milk foods and of the baby who gets them; milk depots for the distribution of clean milk and the supervision of its feeding; visiting nurses, who seek out those who

do not come to ask for instruction; recreation piers, floating hospitals, summer dispensaries, all will help; but if the past be any criterion for the future they will help very slowly.

The past year has established a few facts about poliomyelitis. It is communicable; its incubation fluctuates about nine days as a mean; its virus, which has been no more accurately determined, exists in the blood, the spinal fluid and in the nasal secretions, apparently not in the urine and feces; flies can carry virus in their gastrointestinal tract for forty-eight hours; the subject of the disease may be infectious while the acute symptoms last; one attack seems to protect against a subsequent exposure and a serum can be produced, but of only slight efficiency; hexamethylenamine and some of its combinations retard the experimental infection and might help in prophylaxis. These facts, and 8,000 reported cases in the United States and Canada in 1910, which mean a much greater true total, show us the problem confronting us, and while they give us much less to work on than we would they did, suggest for the coming months isolation and screening against flies of all cases, care in disinfection of their nasal passages and those of all who are exposed with them and the exhibition of hexamethylenamine as a prophylactic agent where the disease is epidemic. Moreover, inasmuch as a case may seem to subside only to light up again with fresh paralysis, and because the active agent is excreted by the patient, an antitoxic serum, even if weak, if it can be obtained, should be given with hexamethylenamine during the period of infectiousness.

Our laboratories and our field workers are actively engaged on this great problem. May the good fortune of discovering the cause and the remedy come soon to someone!

ORIGINAL COMMUNICATIONS.

HEREDITARY SYPHILIS AND THE WASSERMANN REACTION.*

BY MARK S. REUBEN, M.D.

INTRODUCTION.

Syphilis made its first appearance in Europe at the end of the fifteenth century. This disease was unknown to the ancient Hebrews, the Greeks and the Romans. The first to write a book on this disease was a German physician, Joseph Grundbeck, who wrote "On the Venereal Disease" in 1496. In the latter part of the eighteenth century Hunter demonstrated the sequence of the secondary and tertiary lesions and their relation to the primary or initial lesion. In 1837 Abraham Colles, an English surgeon, made the observation which has come to be known as Colles' law; and that is, "that a child born of a mother who is without any obvious venereal symptoms, and which, without being exposed to any infection subsequent to its birth, shows this disease when a few weeks old, this child will infect the most healthy nurse, whether she suckle it, or merely handle it and dress it; and yet this child is never known to infect its own mother, even though she suckle it while it has venereal ulcers of the lips and tongue." It was forty years later that Giuseppe Profeta, an Italian physician, made the observation that an infant born to syphilitic parents may be immune to syphilis, either or both of the parents having syphilis.

That syphilis may be a bacterial disease was already thought of in 1675, when Antony Von Leeuwenhoek demonstrated the existence of bacteria by the perfection of a simple lens.

In 1837 Donn  demonstrated a spirillum in chancres.

In 1881 Lustgarten described a bacillus which he found in all chancres, but this bacillus is now known to be a member of the smegma bacillus group.

In 1899 Von Neisser isolated a bacillus which he could cultivate and with which he could transmit syphilis to the monkeys, one pig, one dog, one rabbit, and three guinea pigs, but others failed to substantiate his findings.

In 1902 Bordet and Gengou noticed a delicate spirillum in

* Read in Pediatric Section of Academy of Medicine, March 9, 1911.

chancres, but as they could not cultivate it they gave up further research in that direction.

In 1904 Siegel discovered a small spherical, highly refractive and actively motile flagellated organism.

In 1905 Schaudinn and Hoffman, at the request of the German government to investigate the findings of Siegel, discovered the spirocheta pallida, which now bears their name and which is granted to be the cause of syphilis.

In 1903 Metchnikoff and Roux showed the possibility of transmitting syphilis to the higher apes. A few years later other investigators were able to produce syphilitic infiltration in the cornea of the rabbit.

In 1903 appeared a notable article by Matzenauer, in which he disproves Colles' and Profeta's laws on a clinical and a pathological basis.

A few years later Bordet and Gengou described the phenomenon of complement fixation. And four years later Wassermann, Neisser and Bruck described a method for the diagnosis of syphilis in the laboratory, which is based on the phenomenon of complement fixation, and which is known as the Wassermann reaction.

The value of the Wassermann reaction in diagnosis of syphilis is well known to every medical man; that the Wassermann reaction has thrown some light on the nature of transmission of syphilis, and that through it we have collected data which disprove Colles' and Profeta's laws—laws which have been considered as truisms—is not so well appreciated. When Matzenauer suggested that Colles' law only proved that the woman was immune only in so far as her syphilis was latent, he met with such general dissension as the suggestions of very few men have ever aroused. That he is right and the others are wrong we have more than ample proof now.

WHAT IS THE WASSERMANN REACTION?

The blood serum of one animal species, when injected into the vessels of another, may do serious damage, and even kill the latter through a rapid separation of the hemoglobin from the red blood cells. As the animal body is capable of adapting itself to toxic substances and to bacteria in such a way as to neutralize toxins and destroy bacteria, so it may respond similarly to the introduction of other foreign bodies as red blood cells.

The red blood cells of a guinea pig are not normally lytic

for the red blood cells of the rabbit. If we inject a few cubic centimeters of whipped blood of the rabbit (containing serum and the red blood cells) into peritoneal cavity of a guinea pig, and when blood from this guinea pig is drawn and allowed to clot the serum collected is markedly lytic for rabbit corpuscles. This process is called hemolysis. The serum possessing this capacity is called a hemolytic serum.

The hemolytic power of the serum of the guinea pig acquired by introduction of red blood cells of rabbits into its peritoneal cavity is due to two distinct substances. One results from the adaptation of the animal to alien blood and is thermo-stabile at 58°C. (amboceptor); the other, which is present in normal serum, is rendered inert at 58°C. (thermo-labile) (complement).

For hemolysis to take place both these substances (amboceptor and complement) must be present.

Knowledge of these facts is essential, for in the Wasserman reaction a hemolytic serum enters into consideration.

In a Wassermann reaction the following factors enter into consideration:—

- I A hemolytic serum—rabbit's blood immunized to sheep's blood (contains amboceptor and complement).
- II Sheep's red blood cells.
- III Antigen (which gives rise to *antibodies*) derived from a syphilitic liver.
- IV Serum of luetic patient.
- V Complement—derived from serum of guinea pig.
- IA = I warmed to 58°C. (contains only amboceptor).

- | | | |
|----------------------------|-----------------------------|---|
| (a) I + II | = Hemolysis | = Amboceptor + Complement. |
| (b) IA + II | = No hemolysis | = Amboceptor. |
| (c) IA + II + III | = No hemolysis | } = Amboceptor + Red blood cells + Antigen. |
| (d) IA + II + III + V | = Hemolysis | } = Amboceptor + Red blood cells + Antigen + Complement. |
| (e) IV + III + V | = { Complement
Fixation | } = Antibodies + Antigen + Complement. |
| (f) IV + III + V + II + IA | = { No hemolysis
+ W. R. | } = Antibodies + Antigen + Complement + RBC + Amboceptor. |

In (a) hemolysis takes place because both amboceptor and complement are present.

In (b) and (c) no hemolysis takes place because there is no complement present.

In (d) hemolysis takes place because both amboceptor and complement are present.

In (e) the complement is fixed to the syphilitic antibodies.

In (f) no hemolysis takes place, because the complement has been fixed to the syphilitic antibodies, and has been deviated from the amboceptor, which without the complement cannot hemolyse the red blood cells. No hemolysis takes place, therefore, because the complement has been deviated.

The Wassermann reaction is, therefore, a test for complement deviation or (more significantly in German) "*complement ablenkung*." When the blood of a patient causes complement fixation, and thus prevents hemolysis from taking place, the patient has syphilis and the result is a positive Wassermann reaction.

Various modifications of the Wassermann reaction have been suggested. The most important are the following:—

	Anti-sheep	Complement	Amboceptor	Corpuscles	Patient's Serum	Antigen
Wassermann		Guinea pig	Rabbits immunized to sheep's blood	Sheep's	Inactivated	Syphilitic organ
Bauer		Guinea pig	Natural anti-sheep amboceptor of human origin	"	"	"
Hecht		Patient's serum	Patient's serum	"	Active	"
Stern		"	Immune anti-sheep amboceptor added	"	"	"
Detre		Rabbit	Anti-horse amboceptor	Horse	Inactive	"
Kaliski		Patient's own + Guinea pig	Rabbits immunized to sheep dried on paper or liquid	Sheep	0.02 c.c. active serum = 1 capillary drop	Syphilitic liver or beef heart or normal liver (acetone insoluble fraction)
Noguchi	Anti-human	Guinea pig	Rabbits immunized to human corpuscles	Human	Fresh, old, or inactivated	Normal or luetic organ (acetone insoluble fraction)

MODE OF TRANSMISSION OF SYPHILIS.

Various authors have demonstrated spirochetæ pallidæ in the testicle and in the ovary of affected feti; still, numerous ex-

aminations of spermatic fluids have failed to reveal the presence of the spirochetæ in this fluid. Finger inoculated 2 monkeys with spermatic fluid of a syphilitic and was able to produce syphilitic lesions in them. It is possible, therefore, that the spirochetæ may exist in the spermatic fluid in a spore-like or some other form not yet demonstrated or in a form so small as not to be seen by the microscope. It is well known that most tuberculous fluids are "sterile"; not sterile in the proper sense of the word, but in the sense that it is impossible to demonstrate the tubercle bacilli in this fluid; when this fluid, however, is injected into a guinea pig or other susceptible animal the animal develops tuberculosis. Tuberculous fluids, though supposed to be sterile, are therefore really not sterile and do contain the tubercle bacilli in some unrecognized form. The analogy between this and the production of syphilis in monkeys with syphilitic spermatic fluid is (I think) complete. We cannot disprove that this mode of transmission of syphilis does not take place in human beings, nor can we prove it. Granting this mode of transmission possible, it is highly improbable that the ovum is infected directly by the spermatic fluid. Most likely it becomes infected from the mother through the placenta, who may be infected directly by the spermatic fluid.

If the ovum were infected at the time of impregnation it is not probable that it could go on to a stage of development observed in syphilitic feti that are aborted, prematurely born or stillborn.

There is only one other mode of transmission possible, and that is by way of the placenta. Whether a healthy non-diseased placenta can transmit spirochetæ is an open question. Sufficient evidence is at hand to prove that in a majority of cases of syphilitic infants pathologic findings are noted, such as the syphilitic virus is known to produce. Spirochetæ are usually found in abundance in the fetal portion of the placenta, and almost always in the cord, but are seldom found in the maternal portion of the placenta.

From these facts we can make the following deductions:—

- (1) If an infant is syphilitic its father may or may not have syphilis.
- (2) If an infant is syphilitic its mother invariably has syphilis.
- (3) The most usual mode of transmission of syphilis to infants is by way of the placenta.

Statistics on this point are of interest: Of 123 mothers whose

blood was examined within a short time of birth of syphilitic infants, 110 (90 per cent.) gave a positive Wassermann reaction.

COLLES' LAW AND THE WASSERMANN REACTION.

By Colles' immunity is meant that which is shown by those healthy mothers who, owing to syphilis in the father, have borne syphilitic children but have themselves escaped infection. In the "American Text Book of Surgery," 1903, the following statement is made: "The immunity has been proved in thousands of cases, and there is no longer any doubt that it may exist. It is true exceptions are published, but they are few and uncertain."

If we believe in the most reasonable explanation of the mode of transmission of syphilis to the infant, the fallacy of the above law is evident. The Wassermann reaction throws more light on this subject.

Compilation of statistics given by Knopfmacher, Michaelis, Baisch and others show the following:—

(1) Of 125 mothers, who at no time had any syphilitic symptoms and who at no time received any antisyphilitic treatment, 82 (71 per cent.) gave a positive Wassermann reaction.

(2) Of 25 mothers (Knopfmacher) who had symptoms, and some of whom had received antisyphilitic treatment, 18 (72 per cent.) gave a positive Wassermann reaction.

The small per cent. of positive Wassermann reactions in the untreated cases may be due to the fact that the children may have had acquired syphilis.

It is of interest to compare the per cent. of positively reacting mothers with results obtained in syphilitics of the acquired form.

Primary syphilis	78 per cent.
Secondary "	92 " "
Tertiary "	82 " "
Early latent	72 " "
Late "	58 " "

(The above figures represent the averages obtained by adding 4,500 cases reported by Wassermann, Noguchi, Kaliski and Knopfmacher respectively.)

It is seen that mothers who give birth to syphilitic children react to the Wassermann test in the same way and to the same per cent., as do those who have acquired syphilis in an early latent stage.

We may therefore conclude that mothers who give birth to syphilitic children are themselves syphilitic, whether they have any symptoms or not, and react to the Wassermann test as do those who have acquired syphilis in an early latent stage.

There are two factors which influence the per cent. of positive reactions in mothers of syphilitic children:—

(1) The number of children.

(2) The length of time which elapsed after the birth of the last syphilitic child and the time when the mother's blood was examined.

Mothers who have given birth to from 1 to 7 children gave a positive Wassermann reaction in 60 per cent. of the cases. Those who have given birth to 8 or more children give a positive Wassermann reaction only in 46 per cent. of the cases (Knopfmacher). It may be noted that those who have given birth to 8 or more syphilitic children react to the Wassermann test, as do those with acquired syphilis in a late latent stage. The influence of time between the time of the birth of the last syphilitic child and the time of the examination of the last syphilitic infant is shown in the following:

Of 123 cases collected, in which the mother's blood was examined within a short time (less than one year) of birth of last syphilitic infant, 110 (90 per cent.) gave a positive Wassermann reaction. Many small collections of cases included in the 123 cases, reported by various investigators, gave a 100 per cent. positive reaction.

If the mother's blood is not examined from three to five years of the birth of last syphilitic child only 50 per cent. of these mothers give a positive Wassermann reaction.

PROFETA'S LAW AND THE WASSERMANN REACTION.

Profeta's immunity is the immunity of children of syphilitic parents, either or both being syphilitic. It was thought that children in many such cases were born healthy and remained healthy, and that some of them were proof against the contagion of syphilis just as if they had had the disease. The results of the Wassermann reaction in these cases show very clearly that this law also is a fallacy.

Of 123 mothers who gave a positive Wassermann reaction, 110 of the infants (90 per cent.) gave a positive Wassermann reaction. The fact that 13 of these infants did not give a positive

Wassermann reaction does not mean that they have not syphilis. It has already been remarked that a certain per cent. of syphilitics with active lesions do not give a positive reaction, so that absence of a positive Wassermann reaction in these 13 cases may be explained on that ground.

That the Wassermann reaction does not depend on a diffusible chemical substance found in mother's blood which is transmitted to the infant the following table shows very clearly.

Of a group of 14 mothers and 14 infants examined (by Baisch) the following reactions were noted:—

MOTHERS.	INFANTS.
9 W. R. +	9 W. R. +
4 W. R. +	4 W. R. —
1 W. R. —	1 W. R. +

It has been noted in a few cases, where the mother was suffering from active lesions and gave birth to an infant, that the infant gave a negative Wasserman reaction.

We may conclude that the great majority of infants of syphilitic mothers are themselves syphilitic. It may be possible that a syphilitic mother (*i.e.*, with latent syphilis) may give birth to a healthy infant, (?) but such a mother never gives birth to children who are immune to syphilis and healthy at the same time.

As a corollary of the above we may state a luetic mother may give birth to luetic (great majority) or to healthy children, (?) but to none that are immune.

HEREDITARY SYPHILIS.

Infants suffering from hereditary syphilis almost invariably give a positive Wassermann reaction. Of 300 cases examined 298 gave a positive Wassermann reaction. Whereas, a positive Wassermann reaction absolutely speaks for presence of syphilis, a negative reaction does not absolutely mean the absence of syphilis.

In cases of hereditary syphilis, before any symptoms manifest themselves, the Wassermann reaction may be negative; later, with advent of symptoms, positive.

Infants born of syphilitic mothers give a positive Wassermann reaction, though they have no signs nor symptoms of any syphilitic infection.

Of 44 children suffering from late hereditary syphilis, 26 gave a positive reaction and 18 negative Wassermann reaction.

INFLUENCE OF TREATMENT ON WASSERMANN REACTION.

The earlier treatment is instituted the sooner will the reaction become negative. In a few cases the Wassermann reaction is negative before treatment and becomes positive after treatment.

When treatment is commenced as soon as the diagnosis is made 75 per cent. give a negative Wassermann reaction within one month. When treatment is delayed for six months only 33 per cent. of negative reactions will be obtained.

KI—atoxyl, soamin, orsudan have little or no influence on the Wassermann reaction.

Salvarsan (606) will cause a + Wassermann reaction to become negative in from three weeks to two months.

In children under treatment it is harder to negate a Wassermann reaction than in adults.

THE CURABILITY OF LUES AND THE WASSERMANN REACTION.

The question "Is syphilis a curable disease?" we must answer in the negative. Syphilis is not a curable disease—at least we must admit that neither mercury nor salvarsan (?) cures it. These drugs relieve symptoms, mitigate and hold the disease in check, but they do not cure it. After the most thorough mercurial treatment many cases have had syphilitic recurrences. After two and three injections of salvarsan recurrences have already been noted. Many cases with a positive Wassermann reaction, which became negative after treatment, have again become positive after three or four months have elapsed, and since a positive Wassermann reaction means the presence of spirochetæ these cases cannot be called cured. Further proof of the incurability of syphilis we have in the fact that the great majority of people do not contract this disease more than once. That there are exceptions to this rule is undisputed, but it must be apparent that the reason why the majority of the so-called "cured syphilitics" do not contract the disease a second time is because they still have syphilis; in a latent form, perhaps, but syphilis they have, so that "once a syphilitic always a syphilitic" holds true in the majority of the cases. It is true, Finger was able to reinoculate 5 out of 12 monkeys, but that was in the primary stage, before the disease became systemic.

Many women with florid syphilis who had undergone thorough mercurial treatment before conception, have given birth to apparently healthy children. (No Wassermann test made on these

children.) Two or three years later these same women, with no renewed treatment, have given birth to stillbirths, premature children, or have aborted. In these cases, also, we have further proof that treatment does not, in a majority of the cases, cure the disease, but transforms it into a quiescent, latent state, which at some future time may reassert itself with as much vehemence as it ever existed before. It is true that the latent state may last as long as the patient lives, but there is always the possibility of the disease reasserting itself when the patient's resistance is lowered from one cause or another. We may therefore conclude that neither mercury nor salvarsan (?) cures the disease, but rather transforms an active syphilis into a latent form.

Patients with so-called "cured syphilis" are but seldom reinfectured, because they have syphilis in a latent form.

The latent period produced by treatment may last through the remainder of the patient's lifetime; in many cases it does not.

WASSERMANN REACTION AND THE WET NURSE.

Although the Wassermann reaction is not a specific reaction, it is characteristic of syphilis. Various authors have put different interpretations on the presence of a + Wassermann reaction. Some believe it signifies the presence of colloidal substances found in the blood, which, normally found in this fluid, are found in increased amounts in syphilis. Others believe that it is not specific for spirochetæ, but is specific for the disease. But the consensus of opinion is that a positive Wassermann reaction means the presence of spirochetæ in the body.

In this connection it may be stated that in an examination of 1,010 normal persons not once was the Wassermann test positive. This is Wassermann's own finding. It is, therefore, conclusively proven that a positive Wassermann reaction means the presence of syphilis, and as corollary of this we may state that a positive Wassermann reaction means the presence of spirochetæ in the body.

The importance of testing the blood of a wet nurse is apparent. Whereas, a positive Wassermann reaction means the presence of syphilis, a negative Wassermann reaction does not mean that the nurse is not syphilitic.

It is also necessary to test the reaction of the blood of the infant. If the infant gives a positive Wassermann reaction the

mother is syphilitic whether she gives a positive Wassermann reaction or not. This step must be taken when the mother (wet nurse) gives a negative Wassermann reaction.

FREQUENT MISCARRIAGES AND THE WASSERMANN REACTION.

Of 32 women in whom syphilis was suspected and whose blood was examined for the Wassermann reaction, 28 (87 per cent.) gave a positive reaction. The most usual time for these women to abort is after the fourth month, at a time when the placenta is fully developed. This lends further proof to probable infection of fetus by way of the placenta at this time.

THE VIRULENCE OF INFECTION.

At onset of the disease the virulence of the disease is not as great (*i.e.*, first three months) as it is at a later date; it then remains stationary (four to six years), and after a number of years begins to decline.

Evidence of this we have in the way syphilitics react to the Wassermann test. In the primary stage only 78 per cent. give a positive Wassermann reaction; in the secondary 92 per cent., and in the tertiary stage 82 per cent. Wassermann reaction.

Further proof is obtained from the manner syphilitic mothers behave during pregnancy. If the infection is very severe she will abort; if less severe she will have a miscarriage or premature birth; if still less severe a stillbirth at full term. Later she may give birth to a full term syphilitic infant; and when her syphilis has become latent she may give birth to an apparently healthy infant.

We have additional proof in that only 20 per cent. of mothers give a positive Wassermann reaction after birth of first infant; 100 per cent. after birth of fourth, fifth, sixth and seventh infant, and 80 per cent. after eighth infant.

SYPHILIS AS A CAUSE OF INFANT MORTALITY.

Eighty to ninety per cent. of all men have, or have had, gonorrhea. To every 10 men who have gonorrhea there is 1 who has syphilis, so that 8 to 9 per cent. of all men have syphilis. It is stated that about 5 per cent. of all women have syphilis. Syphilis

is claimed to be the cause of infant mortality in 1.2 per cent. of the cases.

That the mortality of infants due to syphilis is much greater than the above figures show is hardly appreciated. Of 904 children born to syphilitic mothers, 768 died within one year. To 23 syphilitic mothers 153 children were born; of these, 153 died within one year, so that syphilis annihilates posterity in no small number of families.

An analysis of all the pregnancies of 80 syphilitic mothers shows the following:—

(a) Number of conceptions	464		
(b) Abortions	115	— 25 per cent.	
(c) Stillbirths	20	— 5 “ “	
(d) Premature births	35	— 8 “ “	
(e) Luetic at full term	133	— 28 “ “	
(f) Apparently healthy	87	— 18 “ “	
(g) Died within one week	75	— 16 “ “	

It is seen, therefore, that on the average a syphilitic woman conceives about six times, but seldom has more than $2\frac{3}{4}$ living children, unless the number of pregnancies is more than six.

It has already been stated that of 904 syphilitic infants born at full term 768 died within one year (85 per cent.). Only 28 per cent. of all conceptions of syphilitic mothers result in full term syphilitic infants, and 85 per cent. of these die within one year, so that only 5 per cent. of all conceptions of syphilitic mothers result in syphilitic infants which survive the first year.

Adding the 18 per cent. of the apparently healthy infants born to syphilitic mothers to the 5 per cent. syphilitic infants which survive the first year, there is a total of 23 per cent. of all infants which, born to syphilitic mothers, survive the first year. Seventy-seven per cent. of all conceptions of syphilitic mothers result in death of the infants within one year of birth.

As syphilis causes death of the infant before birth in 50 per cent. of all pregnancies of syphilitic women, 3.4 per cent. would more correctly express the per cent. of syphilis as a cause of infant mortality than 1.2 per cent.

By way of prophylaxis it may be stated that 75 per cent. of all syphilis is spread by prostitutes, and that from 80-90 per cent. of all prostitutes have syphilis. The problem of prophylaxis of syphilis is mainly one of supervision of prostitution. Though

syphilis causes more deaths in the first year of life than measles, pertussis, scarlet fever and diphtheria combined, there is practically nothing being done by the Boards of Health or medical profession at large to safeguard the health and lives of the innocent infants. As yet "the cry of the unborn" is unheeded.

HEREDITARY SYPHILIS AND THE WASSERMANN REACTION.
ILLUSTRATED.

Through kindness of Dr. L. E. La Féra I am able to present the history of a syphilitic family with reports of Wassermann reactions, which illustrate most of the points discussed in this paper.

October 16, 1909, Mrs. C. brought her youngest son William to the Vanderbilt clinic for treatment. The mother stated that there had been a fissure in the anal region of the infant for the past six weeks, and that it did not show any tendency to heal. The child had never been ill before; no early history of snuffles, or rash of any kind, could be obtained. Physical examination was entirely negative; neither spleen nor liver were enlarged; the glands were not enlarged; there were no scars. There were some signs of a mild rickets. A von Pirquet test was made. On the strength of the family history and of the chronicity of the fissure a diagnosis of syphilis was made. The infant was put on mercury internally and calomel locally to fissure. At the next visit of infant it was noted that the von Pirquet test was negative. Treatment was continued. Ten days later a Wassermann test was made. The Wassermann reaction was negative (probably due to mercurial treatment). Treatment was continued in spite of negative Wassermann reaction, and within three weeks of first visit the fissure had completely healed.

Family History.—The mother had been married once before, and by that marriage had conceived six times.

The first was a healthy child, lived three years, died of scarlet fever and diphtheria.

The second was also a healthy child, lived two years and died of cholera infantum.

The third, fourth and fifth were stillbirths at full term.

The sixth, a prematurely born child at eight months, died within one week.

The first husband died in 1899 of cerebrospinal meningitis and pneumonia.

The mother remarried in 1900, and by her second marriage has five children, the infant above described being the youngest of these.

The Mother.—Repeated examinations of the mother have failed to show any past or present signs of any syphilitic infections.

The Second Husband.—Repeated examinations of second husband have failed to show any signs of any old or recent syphilitic lesions.

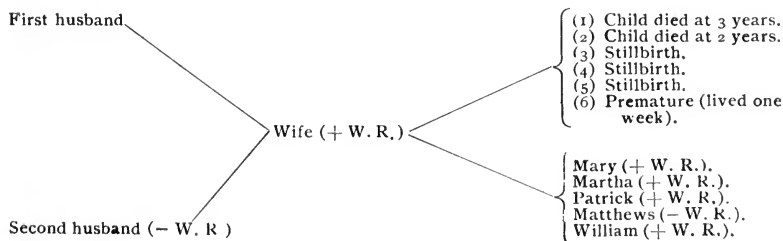
November 19, 1909, Martha (seven and one-half years old), second daughter, was brought to clinic suffering from a unilateral sore throat. Examination showed a diphtheritic-like deposit on right tonsil; cultures were negative; a diagnosis of mucous patch was made.

December 16, 1909, Mary, oldest child (nine years old), was brought to clinic suffering from mucous patches on both tonsils.

December 13, 1910, Patrick (six years old) was brought to clinic suffering from mucous patches of both tonsils.

December 13, 1910, William (three years old), was brought to clinic suffering from mucous patches of both tonsils.

December 20, 1910, blood for a Wassermann test was taken from every member of the family. The results of the reactions are as follows:—



The history of this family presents the following points of interest:—

(1) It proves that the mother of children suffering from hereditary syphilis invariably has syphilis; that their father may or may not have this disease (as the mother may acquire the disease in other ways; in this case from her first husband).

(2) It disproves Colles' law. Though the mother never had any obvious venereal symptoms, she gives a positive Wassermann

reaction, thus proving that this mother has syphilis in a latent form.

(2) It disproves Profeta's law, for all the children born to this mother have syphilis. The Wassermann reaction of Matthews is negative, which is probably due to the fact that the syphilis is latent. Later in life symptoms may develop, and his reaction will undoubtedly become positive.

(4) It proves that after a certain number of years (six) the virulence of syphilis has a tendency to decline, even where treatment has not been instituted.

CONCLUSIONS.

(1) The most usual mode of transmission of syphilis to fetus is through the placenta. If the infant is syphilitic the mother is invariably syphilitic also; the father may or may not have syphilis.

(2) Mothers who have no syphilitic symptoms, but who give birth to syphilitic children, have syphilis in a latent form; 71 per cent. of these women give a positive Wassermann reaction.

(3) Mothers with syphilitic symptoms, who give birth to syphilitic children, give a positive Wassermann reaction in 72 per cent. of the cases.

(4) The earlier the blood is examined after delivery of last syphilitic child, the greater the per cent. of positive Wassermann reaction. If the mother's blood is examined within one year of birth of last syphilitic child we obtain 90 per cent. + Wassermann reaction. If within four years we obtain 40 per cent. + Wassermann reaction.

(5) The great majority of infants of syphilitic mothers are themselves syphilitic. A syphilitic mother may give birth to a syphilitic child, or during her latent stage to an apparently healthy infant, but never to one who is immune to syphilis.

(6) Ninety-nine per cent. of infants with hereditary lues give a positive Wassermann reaction. Fifty per cent. of infants with late hereditary lues give a positive Wassermann reaction.

(7) An infant suffering from hereditary lues may give a negative Wassermann reaction before any symptoms are present, and a positive Wassermann reaction later when symptoms arise.

(8) Mercury and salvarsan cause a + Wassermann reaction to become negative. In a certain number of cases the reaction becomes positive again within six months.

(9) Mercury and salvarsan (?) do not cure syphilis. These drugs transform an active lues into a latent lues. Reinfection occurs but seldom, because the so-called "cured cases" have syphilis in a latent form.

(10) The blood of every wet nurse should be examined for the Wassermann reaction. If it is positive she has syphilis and should not be employed; if it is negative the blood of her infant should be tested; if it is positive the mother (wet nurse) has syphilis, even though her own reaction is negative.

(11) The virulence of syphilis is mild at first, increases in severity for a few years, then remains stationary and later begins to decline.

(12) Syphilitic women on the average conceive about six times, but seldom have more than $2\frac{3}{4}$ living children, unless the number of pregnancies is more than six. Seventy-five per cent. of all conceptions of syphilitic mothers result in deaths of the infants within one year of birth.

In conclusion I wish to express my indebtedness and sincere thanks to Dr. La Fétra for the invitation to present the family here described at the Academy of Medicine, and for the privilege of reporting the history in connection with this paper.

I also wish to express my sincere thanks to Dr. Kaliski, who performed the Wassermann reactions on all the members of this family, and many other cases cited in this paper.

1967 Seventh Avenue.

TRANSIENT PRESENCE OF CASTS IN URINE OF HEALTHY INFANTS.—Goldsmith (*Journal American Medical Association*, January 8, 1910), out of curiosity, examined the urine of a perfectly healthy male child, aged eleven and one-half months, who had been properly fed and weaned after nine months. He was surprised to find in it a large number of hyalin and pale granular casts, "an appearance suggesting the showers of casts seen in adults." There was neither albumin, blood, nor any other constituent to suggest renal disease. The day before the child had possibly not been quite so lively as usual, but there was nothing indicative of ill-health, and on the day in question was as well as possible. Daily examination of the urine for the next two weeks and occasional examination subsequently, however, failed to reveal anything abnormal.—*British Medical Journal*.

A STUDY OF NON-DIPHTHERITIC EXUDATES.*

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This study is based upon a series of cases treated in the wards of the Philadelphia Hospital for Contagious Diseases. It is from both a clinical and bacteriologic standpoint. There is a difference of opinion concerning the value of bacteriologic examinations of throat infections as an aid to diagnosis and treatment. There are many in the profession who believe that a diagnosis can be made in the laboratory. They are often mistaken. Another and larger group believe that they can make unfailing differential clinical diagnoses without the aid of the laboratory methods. They are even more mistaken. In a hospital for contagious diseases, where one has the opportunity of studying a wide range of cases from both a clinical and bacteriologic standpoint, the relation between clinical and bacteriologic findings is not uniform by any means. However, there is no group of cases in which the laboratory can be of more aid than in these, especially if there is a proper correlation of both clinical and laboratory findings. In many of these cases a clinical diagnosis of diphtheria was made, and such mistakes will continue to occur because the clinical course is quite variable and the symptom-complex indefinite.

All cases sent to the diphtheria and scarlet fever departments are cultured upon admission. A primary negative culture of Klebs-Loeffler bacilli does not exclude a diagnosis of diphtheria by any means. But if subsequent cultures are likewise negative then special studies are made to determine the cause of the infection. All cases developing after admission are likewise investigated. Our non-diphtheritic cases presented the following four infections: Plaut-Vincent's angina, pneumococcic, streptococcic and staphylococcic anginas.

PLAUT-VINCENT'S ANGINA.

Many practitioners have a vague knowledge of this disease. To not a few the name is suggestive of some extensive deadly

* Read before the Philadelphia Pediatric Society, March 14, 1911.

infection. The disease may be divided into two main types—one being characterized by the presence of exudate and extensive ulceration of the tonsils and uvula; the second by a peculiar ulceration of the gums. The exudate may be very readily mistaken for true diphtheria and the practitioner will do well to bear the condition in mind, especially if connected with an institution for children or in charge of a dispensary.

This series includes 24 well-marked cases. Seventeen cases occurred in the diphtheria department. Three cases were sent to the hospital with a diagnosis of diphtheria. One case required intubation. Seven cases developed in the scarlet fever department. The lesions were distributed as follows: On the tonsils and uvula in 12 cases; on tonsils and gums in 9 cases; the gums alone were involved in 3 cases.

The majority of patients do not appear very sick and one is often surprised to note the extensive exudate and comparative absence of toxemia and pain. The exudate is usually dirty yellow in color, sometimes brown, due to the presence of decomposed blood; it crumbles somewhat when touched with a probe and bleeds easily. There is usually well-marked ulceration and sloughing; the uvula often seems to melt away. The breath is foul, the odor is somewhat characteristic and quickly permeates the room or ward. One often suspects the presence of the disease from the odor alone. In the second group of cases the condition may be easily overlooked. The gums are involved and attention may be attracted to the condition because the gums bleed easily when the child coughs or bites into a piece of bread. Inspection shows the infected tissues to be spongy, especially along the margin, and easily separated from the teeth. Soon the inevitable punched out ulceration appears with a thin, filmy exudate. The teeth may loosen, and in a few cases the ulceration extends to quite a depth with destruction of the soft parts. One of us had the opportunity of observing a case of this kind in an institution for children. Destruction was so extensive as to infect the left antrum of Highmore. There was extensive edema of the overlying tissues and well-marked exophthalmos and edema of the capsule of Tenon. The organisms were found in great abundance in the primary lesion, and in the nasal discharge and after death, in the antrum.

Rauchfus is supposed to have been the first to observe the association of fusiform bacilli and spirilla in cases of ulceromembranous angina. In 1894 Plaut writes more definitely of his find-

ings in 5 cases. In 1896 Vincent published his observations upon these organisms in hospital gangrene and certain anginas. Bernheim followed in 1897 with an account of similar findings in 30 cases of stomatitis and angina. In 1898 Vincent made another report on 14 cases, and his name has become attached to the disease. Since then there have been other contributions by both American and foreign writers.

The bacteriologic diagnosis is made by examination of direct smears of the exudate. Early attempts to secure in pure culture the fusiform bacilli and spirilla causing this condition failed, and it was not until 1904 that Ellerman claims to have grown a pure culture of the fusiform bacilli on serum agar. The spirilla have never been secured in pure culture, although Weaver and Tunnicliff claim to have cultivated them in mixed culture in human pleuritic exudate and broth. The organisms are never found in pure culture in the lesions. Staphylococci and streptococci are usually present. German observers have noted the simultaneous presence of diphtheria bacilli. We have found but one instance of this combination, although many of our cases were in the diphtheria wards. Tunnicliff has observed in older cultures of the fusiform bacilli the presence of many spirilla, and for this reason is led to believe that the spirilla represent older types of the fusiform bacilli. We have also noted that in early lesions of Vincent's angina the fusiform bacilli predominate, and later, when ulceration is marked, the spirilla are more numerous.

Both fusiform bacilli and spirilla resembling the organisms of Plaut-Vincent's angina may be found in healthy mouths. One of us examined the mouths of over 100 healthy children in an institution where the disease was a frequent occurrence. While spirilla resembling the spirilla of the angina were found in small numbers in a large percentage of these children, yet the finding of fusiform bacilli was much less common. This has influenced us in placing a great deal of stress upon the presence of fusiform bacilli, especially in early lesions.

The bacilli are easily stained by the anilin dyes, especially Gentian violet. They are generally negative to Gram's stain if decolorization is thorough. The spirilla stain with more difficulty and are Gram negative. We secure good preparation by staining according to the method of Gram, with incomplete decolorization and counterstaining with undiluted Ziehl-Neelson's carbolfuchsin. The bacilli are stained a dark violet brown and

the spirilla a deep pink. The bacteriology of this condition is still incomplete. Further studies are being made of serum reactions, cultural methods, and bacterin therapy.

PNEUMOCOCCIC INFECTIONS.

It has been known for some time that the pneumococcus can produce an exudative inflammation of the throat. But this condition is not sufficiently well known or recognized. Our cases number 74 and have been most interesting and instructive. Clinically they may be divided into three main groups:—

A. Cases with well-marked tonsillar exudates.

B. Cases showing redness and edema of the parts without an exudate.

C. A rarer type characterized by the presence of a perforating ulcer of the soft palate and ulcers of the buccal mucosa.

Thirty-four of these cases occurred in the diphtheria department during the past six months. Thirty were sent to the hospital as being diphtheria, and 4 developed the infection after admission. Forty cases occurred in the scarlet fever department. As a general rule, the exudate in scarlet fever is largely streptococcic, staphylococcic, diphtheritic, or a combination of these. It is worthy of special note that during the past six months 20 of these cases presented a pneumococcic exudate upon admission, while the remaining 20 cases developed in the wards.

The lesions were located on the tonsils in 59 cases; on the soft palate and uvula in 7 cases; and upon the buccal mucosa in 8 cases.

The clinical picture is a varied one and a clinical differential diagnosis from diphtheria cannot be made with any degree of accuracy. In 65 of these cases an exudate was present. These exudates varied in color from a greenish-yellow to a white; it is soft, pultaceous, smeary and usually easily detached. It may be confined to the lacunæ or be patchy, may or may not leave a bleeding surface when rubbed off. In non-exudative cases the parts are found to be red, edematous and smeary, with a peculiar stringy mucoid gelatinous film. The tongue and lips become a little redder; the tongue is coated, but the papillæ are not enlarged, and with the appearance of the throat one is frequently suspicious of scarlet fever. A peculiar and fortunately rarer form of this infection manifests itself as a perforating ulcer of the soft palate. The condition is met with in impoverished subjects of scarlet fever. The ulcer spreads slowly; the edges are round, smooth and slightly edematous, with an indolent dead appearance. Treat-

ment is usually ineffective and most of these cases succumb. The infection may also assert itself as a shallow indolent ulcer of the buccal mucosa.

In 1880 Sternberg and Pasteur described a diplococcus in saliva, which subsequent work proved to be what is now termed the pneumococcus. Since then a great deal of work has been done to show the relation of this organism to lobar pneumonia. Extensive studies have been made on methods of isolation, cultural characteristics and identification. The recognition of the pneumococcus is a difficult procedure. Our present methods are by no means entirely satisfactory, and there are many atypical strains difficult to classify. We include only those cases in which cultures answered the generally accepted characteristics of the pneumococcus.

These organisms are found in about 60 per cent. of healthy mouths, and for this reason one must exercise great caution in making the bacteriologic diagnosis. Following this rule in both the diphtheria and scarlet fever departments of the hospital, when an exudate fails to show the presence of Klebs-Loeffler bacilli after at least two successive cultures, smears and additional cultures are made in order to determine the nature of the infection. A direct smear is stained by the method of Gram. If Gram positive lancet shaped diplococci predominate, a second smear is stained for capsules by the acetic acid method of Welch. This was found to be the best method for direct smears of the lesion, for in these preparations the demonstration of capsules is frequently disappointing. By a simple study of such smears one soon learns to suspect the presence of a pneumococcic exudate by the large numbers of diplococci present. In smears of healthy mouths the diplococci are usually few and scattered.

Being a strict parasite the organism is cultivated with some difficulty and the media requires the presence of a serum. After the smears have been examined cultures are made on Loeffler's coagulated blood serum, as the pneumococcus will develop on this media as discreet moist colonies. After twenty-four hours incubation isolation is attempted by streaking upon neutral plain and dextrose blood agar. The colonies are then stained by Gram's method to determine morphologic characteristics and purity of growth. In this way it may be necessary to study a number of colonies. A subculture is then made upon coagulated blood serum and blood agar. If at the end of twenty-four hours the culture

is pure, the organisms are stained for capsules according to the methods of Hiss and Buerger. The capsules are frequently lost in old cultures. Subcultures are then made in the inulin and lactose serum water mixtures of Hiss and inulin bouillon of Duval and Lewis. Typical pneumococci acidify and coagulate the inulin serum mixture in forty-eight hours, and we regard this as a valuable aid in differentiating pneumococci and streptococci. The titration of acidity in the inulin bouillon cultures is more accurate but consumes much time. We carried this out in the same manner as the titration of acidity in glucose bouillon culture of diphtheria bacilli. Diffuse clouding and formation of sediment, as described by Duval and Lewis, is present if the stain is capable of producing much acid, but is of little value in less powerful strains. However, these acid-producing tests are not uniform by any means. One is apt to be disappointed as he is in the various sugar media for differentiating the various organisms belonging to the diphtheria group. Many strains of pneumococci are atypical in morphological and cultural characteristics. It is frequently difficult to differentiate these organisms from streptococci.

STREPTOCOCCIC INFECTION.

It is well known that this organism is capable of producing an exudate. The atypical streptococcic exudate is seen in cases of scarlet fever. Clinically these cases vary from a general faucial redness or a light, smeary, filmy, whitish exudate to the thick, dirty, foul and necrotic exudate of anginose scarlet fever. It is often a difficult task to exclude diphtheria. The patient is quite toxic and the temperature is prone to range higher than it does in diphtheria. It must not be forgotten that the throat symptoms may be accompanied by a slight erythematous rash, which disappears in a few hours or a day. We have frequently seen such cases sent to the scarlet fever hospital. They do not desquamate. But in such cases it is difficult and frequently impossible to differentiate the condition from a mild case of scarlet fever. A streptococcic exudate may be mistaken for diphtheria. Out of 1,404 primary cultures of scarlet fever patients made upon admission to the hospital, 214, or 15.24 per cent., showed the presence of diphtheria bacilli. A small proportion of these presented the usual clinical evidences of this infection. Scarlet fever predisposes to diphtheria and the latter disease can be excluded only by repeated cultures, especially if the case presents a heavy exudate. Out of 447 cases sent to the hospital with a diagnosis of

diphtheria, 5.59 per cent. failed to show Klebs-Loeffler bacilli and yielded repeated pure cultures of streptococci.

Streptococci are usually readily recognized by microscopic examination. As already written, it is frequently difficult at times to differentiate from the pneumococcus when the latter occurs in chains. About 40 per cent. of our scarlet fever patients will show streptococci in the throat when cultured upon coagulated blood serum. If cultures are made directly into glucose bouillon and incubated for twenty-four hours and then subcultured the proportion reaches about 70 per cent.

STAPHYLOCOCCIC INFECTION.

This infection is too well known to require any extensive consideration, except to emphasize the very important relation it bears to diphtheria. The typical staphylococcic exudate is seen in many cases of acute lacunar tonsillitis. While in most cases the clinical picture is so well defined that a diagnosis may be made without the aid of a culture, yet such cases may present clinical appearance very suggestive of diphtheria.

Of the 447 cases with exudates admitted to the diphtheria hospital during the past two months, 3.35 per cent. were purely staphylococcic. Such conclusions cannot be reached by one culture. Several cultures are necessary to exclude diphtheria, and for this reason we believe that all such cases, especially those at all suspicious of being diphtheria, should be cultured at least twice before this infection may be excluded. The most extensive cases of diphtheria are the very ones most likely to yield negative cultures of the Klebs-Loeffler bacillus, because there is superimposed upon the diphtheritic membrane a secondary infection. This is true in about 20 to 30 per cent of cases. The method of culturing has an important bearing. If the exudate is diphtheritic the bacilli are certainly present, hence one must not be content with a superficial swabbing, but culture about the edges or beneath the exudate near the tissues where the bacilli are at work. Only about 25 per cent. of primary cultures of true diphtheria exudates will show the bacilli in pure culture. It is not a safe practice to disregard any of the numerous types of Klebs-Loeffler bacilli in a primary culture. We have frequently noted that in most extensive cases the bacilli are few in number and often of the variety frequently regarded as being less virulent than the typical beaded organism. We believe that a failure to culture is one important reason why many cases of true diphtheria are diagnosed and treated as ton-

sillitis and the disease thereby spread and kept in our midst with unabated morbidity and a far too high mortality.

We hope that this brief study will justify the following conclusions:—

(1) In a well-defined case of diphtheria a clinical diagnosis may be readily made. However, there are other infections which resemble diphtheria so closely that a differential diagnosis may be difficult or impossible. Plaut-Vincent's angina has a symptom-complex which will frequently enable one to make a clinical diagnosis. The pneumococcic exudate presents an appearance which enables the experienced to suspect its presence. Streptococcic and staphylococcic infections are frequently deceptive, and it is very important to remember that they may obscure diphtheria. It is certain that those having the largest experience have been taught to be most wary, and it is not uncommon for the least experienced to be most positive in making a clinical diagnosis.

(2) Laboratory examinations have a definite value and like-wise limitations. Plaut-Vincent's angina, pneumococcic, streptococcic, and staphylococcic infections may be diagnosed by an efficient technic. However, a case of diphtheria may yield negative laboratory results due either to faulty methods of culturing or to an overshadowing secondary infection.

(3) One of the main objects of this study was an endeavor to show the relation between clinical observations and laboratory findings as we found them. To be of the most value both must be used conjointly. Diphtheria is an enemy worthy of our best efforts to overcome. While the power of clinical observation must be cultivated to a high degree, and while it is often difficult to correlate laboratory results with clinical conditions, yet the laboratory has been a valuable adjunct in diagnosis, and we believe that if practitioners would enlist the aid of laboratory methods to a greater extent they would obtain a broader knowledge of exudates and make substantial gains in overcoming diphtheria.

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THE CARE OF THE EXCEPTIONAL CHILD.

BY E. BOSWORTH McCREADY, M.D.

The care of the exceptional child is a problem of interest from three standpoints—that of the educator, the physician, and the sociologist. It does not devolve upon me to instruct you regarding the importance of this subject from the pedagogical standpoint. The time is rapidly passing when the same amount of instruction is administered to all children alike without regard to ability. Up until the last few years there were only two classes of children—the normal and the feeble-minded. We now understand that there are as many classes as there are children, and that while we may speak of the average child, the absolutely normal one is practically an impossibility. This is essentially an individualistic age, and for no reason so much as because of physical and mental nonconformity. The time is not far distant when every child will not only attend school for a certain period, as now required by law, but will also be given the education suitable to his individual mental and physical endowments.

For the recognition of the importance of the problem of the exceptional child you as educators are, I believe, primarily responsible. A specialist in any particular branch of science or art soon learns to recognize those factors that interfere with its advancement. So the far-seeing ones of your profession, recognizing that many children refused to advance at the rate the school authorities deemed proper, cast about for a reason. To this end it was first necessary to determine whether the school curriculum, the teacher or the child himself was at fault. As perfection in anything is difficult of attainment, it was not unlikely that grave defects were found both in the instruction supposed to be administered to the child and in its manner of administration. Long school hours, too large a number of subjects, home work, examinations, lengthy demands upon the attention, too large a number of pupils to one teacher, are subjects which have deservedly received consideration. It is evident, however, that a large number of children do progress under these conditions, while their fellows subjected to the same influences do not. It is obvious, therefore, that we must look to the child himself for the reason for this state of affairs.

If the child himself is responsible is it because of essential incapacity, or is his abnormal mentality dependent upon a removable bodily or environmental condition? It is at this point

that he becomes a medical and sociologic study, and so remains until he either reaches a condition where he may be returned to the educator, or, this being found impossible, is permanently disposed of under the proper custodial care. During this period the close coöperation of educator, physician and sociologist is indispensable. I have been asked to speak upon the "Exceptional Child," a subject which includes a wide variety of classes. I will confine myself, however, to the three general classes which furnish the greatest difficulty to the educator, omitting those whose needs are more obvious, the deaf and dumb, the blind and the physically disabled. I will take up first, the precocious child; second, the backward child, and third, the feeble-minded. The question of the precocious child is almost as important as that of the backward one, and requires even more delicacy in handling, as upon his early management depends not only his future progress, but his health as well. These children are usually the offspring of neurotic parents. How great a factor is hereditary influence has not yet been determined. We are liable to exaggerate the influence of heredity and minimize that of environment. The child of nervous parents is exposed from birth to the influence of all the inconsistencies, errors of judgment and excitations which the state of his elders makes it possible for him to obtain. He is born into a hurried life; bright lights, noise and confusion surround him constantly. Sensations crowd in upon him with a rapidity out of all proportion to his receptive powers. His brain, forced to demand a greater supply of blood than should be its portion, develops at the expense of other organs and other parts of the nervous system. These are the so-called bright children, who astound their parents and friends by their apt questions and answers, their unusual powers of memory, and knowledge of subjects not usually mastered at so early an age. Later they very often fail to fulfill the promise of their early years and exhibit mental power no greater or even less than their more prosaic classmates, or they may become unstable, melancholy, vicious or actively maniacal. The neurotic child—and the precocious child is usually neurotic—responds to an exaggerated degree to excitations of any sort. He starts at sudden noises, bright lights hurt his eyes, powerful odors, pleasant or otherwise, nauseate him, an unexpected touch will make him jump. He undertakes with apparent energy tasks allotted him, but soon tires. He laughs and cries for little or no reason, is capricious, flies into a

temper on the smallest provocation. He is usually imaginative and may seem to prefer falsehood to truth. This is often the result of excessive imagination rather than from any real desire to be untruthful. He sleeps badly, is subject to nightmare and sometimes to sleep walking. Dreams often leave so vivid an impression that they will be told as actual happenings. Day dreams occurring during consciousness may lift the child into a world of his own. Jeanne D'Arc, hearing voices from the "spirit world," and interpreting them as commands of the Deity, appointing her the special instrument of Providence, is an illustration of this propensity.

A normal child is subject to fear only when brought into contact with some condition very unusual to his habitual environment. The neurotic child is, however, peculiarly liable to exaggerate even the most common occurrences into causes for fright. His vivid imagination, fed perhaps by stories of bogies, etc., invented by parents or nurses to exact obedience, sees monsters lurking in every corner, and gives to even inanimate objects terror-striking attributes. In this connection I will quote a case reported by Dr. Fletcher: "A child, aged five, whose parents frequently frightened her by telling of a black hole where witches and hobgoblins abide to punish bad children, having been disobedient, was threatened with being shut up in a dark closet. She immediately became cold, quiet and ghastly pale, trembled and sank down; she was put to bed, and for months muttered and raved about all she had ever heard of unreal things; she recovered, but with a nature changed—the sunlight had gone out of her life." The same writer says: "I have known children of five and six years to become morbidly depressed, moan and cry for hours, mutter and scream in sleep, because the terrors of hell had been so strongly pictured to them by the parents (who had endowed them with supersensitiveness) as a punishment for telling a falsehood (due to diseased imagination) or for the breaking of a window or other trivial accident. Sometimes such children are scared into acute inflammation which forever mars the brain structure."

Children of this type are subject to the same strange fears and obsessions that sometimes possess their neurasthenic elders. Fear of crossing open places, of walking down narrow streets, fear of contamination, etc. Imperative ideas are common. Children will very often be seen gravely touching each paling of a

fence as they pass, or carefully avoiding the cracks in the pavement. For some the whole day is spoiled if the right shoe is put on before the left, or *vice versa*. A great many of our commoner superstitious have, I believe, arisen from these imperative ideas of childhood. How many of us would tempt fate by deliberately walking under a ladder, and how few can resist the sign "wet paint."

Precocious children should be kept back instead of having every effort put forth for their rapid advancement, as is now usually done. They should particularly be developed in those studies in which they are least proficient, their hours of study should be shortened and they should be given every opportunity for open-air exercise. These children are usually deficient in motor control, consequently they should be given exercises adapted to its development. Games of skill and precision, manual training, etc., will do much to bring about uniform development.

The question naturally arises: Is it ever advisable to allow a child with an unusually active and receptive brain to advance at the rate of progress of which he seems capable? I would say, Yes, but only under these conditions. If, after a thorough physical and mental examination, it is found that his physical is on a par with his mental development, there is little or no danger of harm resulting. Physically he should be in almost perfect health and of normal height, weight and chest development for his age. His muscular control and coördination should be perfect, exhibiting no tremors, habit spasms, or involuntary movements other than those natural to a healthy and consequently restless child. He should be free from ocular defect and from every other source of reflex irritation. The studies of Prof. Rotch, of Harvard University, have shown that chronologic age and anatomic age are by no means identical. For this reason an X-ray picture of the wrist should be made to determine whether bony development has reached or is beyond the stage usual in individuals of the same chronologic age as the case under consideration. His mental status should be definitely studied. Determination should be made as to whether his mental development is actually exceptional or whether it only appears so by reason of an unusually rapid reaction to transitory excitations without permanent impression. These children are prying, inquisitive and imaginative. They rapidly acquire useless bits of knowledge which they are able to use at auspicious moments.

They are able to apparently reason with wonderful facility and plausibility, almost intuitively making use of the specious points in an argument, based, however, upon faulty premises. Unless properly controlled, they develop into agitators, faddists, disturbers of existing order.

Another class closely related to the above is that in which the power of association of ideas is so highly developed that an impression of great brilliancy is given. I have seen moral imbeciles in whom the lack of inhibition was so great that they could seldom resist the impulse to kick or strike or to do some other forbidden act, who superficially would give the impression of great brilliancy on account of the disproportionate development of this faculty. The mere mention of a word would so stimulate their association tracts that not only would all the associations usually accompanying that word immediately occur to the mind, but also those common to the association words themselves. Other children may appear exceptionally bright on account of the unusual development of memory, or unusual ability in music, drawing, painting, arithmetic, etc. It must not be forgotten, however, that such endowments are not unusual in those almost totally lacking in mental development in other directions. Many of the lightning calculators exhibited over the country are high-grade imbeciles, and there have been others who could repeat *verbatim* a page of a newspaper after one reading or who could repeat an entire lecture. Blind Tom was an example of unusual development in musical sense with marked deficiency in other directions.

The Backward Child.—We will consider that the backward child is one who is retarded in his development by reason of some condition either inherent in the child himself, which can either be removed or counteracted, or who is subject to some physical defect or environmental condition, the removal of which will allow him to progress in a normal manner under favorable opportunities. The question of the care of the backward child is dependent upon the cause of the retardation. If it is the result of a uniformly slow rate of physiologic development the recognition of this fact with removal of overpressure is sufficient. If frequent change of school, absence from illness or other causes, is responsible, the remedy is obvious. The above-named causes include, however, but a comparatively few of the backward children. The difficulties of accurate classification of any children have already been mentioned. Those, however, who are re-

sponsible for many of the difficulties of the educator will fall more or less accurately into the following divisions:—

(1) Those backward by reason of change of school and absence therefrom for various reasons.

(2) Those of uniformly slow rate of physiologic development.

(3) Those retarded because of biologic variations in special cerebral centers, particularly in those centers making up the zone of language.

(4) Nervous, unruly children.

(5) Those retarded because of physical defects, which can either be removed or counteracted.

The first and second classes require no further comment than has already been made. The third class, however, is a most interesting and important one, both from the standpoint of diagnosis and treatment. In a paper entitled "Biological Variations in the Higher Cerebral Centers Causing Retardation," read before the National Association for the Study and Education of Exceptional Children in New York City, April 26, 1910, and published in the *ARCHIVES OF PEDIATRICS*, July, 1910, I discussed this class of cases at length, with the following conclusions:—

"Clinical evidence would seem to warrant the assumption that

"(1) There is a large number of children retarded in their mental development on account of insufficient activity caused by biologic variations in the special centers making up the zone of language.

"(2) That these children are very likely to be considered feeble-minded unless studied very carefully.

"(3) That these children may eventually become feeble-minded by deprivation, unless their condition is exactly recognized and the proper treatment instituted."

Included in this class is congenital word-blindness, congenital figure-blindness, congenital word-deafness, congenital musical-note deafness, stuttering and delay in acquisition of speech.

Congenital word-blindness is a condition which interferes with the stamping of word images upon that particular portion of the brain which through inheritance from generations of reading and writing ancestors has become specifically developed for their reception. The child with word-blindness is unable to learn to read, or does so only imperfectly, not because he is unable to see words, but because his memory of the appearance of words is im-

perfect. This condition is not so uncommon as might be supposed. Thomas calculates that 1 in 2,000 London elementary school children may be expected to show word-blindness to a considerable extent. I have myself had under observation 3 such cases during the last two years.

Congenital Figure-blindness.—A small proportion of patients subject to word-blindness will show figure-blindness to a greater or lesser degree, although some are exceptionally good at arithmetic. Congenital figure-blindness to any marked degree unassociated with word-blindness has not, I believe, been described, though in speaking of acquired aphasia Bastian says: "On rare occasions it has been found that loss of ability to read and comprehend numerals exists in the absence of word-blindness." Taking these facts into consideration, it would seem that the visual impressions derived from numerals are registered in a brain region which is slightly removed from the visual word center. Children will be found who, while able to recognize the letters of the alphabet both singly and when combined to form words, are unable to recognize or remember numerals, especially when in combination. These children are very likely to be bright in subjects in which figures are not required, though, as in word-blindness, occasional cases will be found in which the lack of cerebral development is more or less uniform, but more marked in this particular direction. These children usually fall far behind in their mathematics and are often kept back in their other classes because they are unable to learn enough arithmetic to admit of their promotion.

Congenital Word-deafness.—Of all the centers concerned in speech the integrity of the auditory is of the most importance; thought in its higher manifestations cannot be carried out without the aid of language of some kind. The most used and most important means of expression is through speech. The proper development of speech is dependent not only upon a perfect peripheral hearing apparatus (the ear) but also upon a perfect auditory center. Congenital deafness always entails mutism, as does acquired deafness occurring before the child has learned to talk. Even the child of five or six years who has learned to talk will, upon becoming deaf, forget how to speak. Under these conditions there is an arrest of development in the auditory center secondary to the peripheral lesion. In word-deafness the variation lies in the auditory word center. In this condition words are heard merely as noise, or impressions only of certain sounds mak-

ing up words may be received. In the first case the child will likely not speak at all, while in the second it will repeat only those sounds which make an impression upon the word-hearing centers. Idioglossia is the term used to denote the last named condition. In other words the child speaks with a language of his own, using only those sounds which he hears. To illustrate I will cite a typical case that has come under my own observation and which I have already reported.

T. F. T., male, aged five years. Referred by Dr. J. Homer McCreedy. First examined February 14, 1910. Family history negative, except that father drank excessively at times. Is the second of three children. Birth normal. Early development normal, except that no attempt to speak was made until the age of two years. He had measles and typhoid fever at four years, from both of which he made a good recovery. The child was robust and in good physical condition. The laryngologist who referred the case stated that the hearing was good and that the nose and throat were clear. Attention was wandering; but general intelligence seemed to be very good. Speech was unintelligible to every one except the child's mother. He rendered go to bed, "do bei"; piece of candy, "pe tandy"; at, "ha"; on, "o"; wax, "wa"; it, "e"; up, "u"; look, "ook." With only a superficial examination I would have classed this boy as imbecile. His marked improvement both in speech and in attention and general intelligence under special training have led me to believe that this would have been a serious mistake.

Congenital musical-note deafness has but a relative influence upon intellectual development. As Bastian says, "The existence of tone-deafness as an isolated and inherent defect is probably far from rare." There are persons who are incapable of discriminating between the two notes of an octave and who, notwithstanding the most frequent opportunities of hearing music, remain quite incapable of distinguishing one tune from another. There are others who, while possessing a "musical ear," are still unable to reproduce what they have heard. It seems very likely that the imperfect appreciation of the various shades of difference in cadence and inflection of the normal voice might have a decided influence upon the causation of word-deafness and of other speech defects.

Stuttering.—In a paper read in the section on nervous and mental diseases of the American Medical Association, at St.

Louis, June, 1910, and published in the Journal of the American Medical Association, July 16, 1910, I attempted to show that stuttering is due to a biological variation, drawing the following conclusions:—

While incapable of proof, it is reasonable to suppose:

First. That the defective use of the muscles of inspiration, expiration and of the lips, tongue and throat, resulting in stuttering, is the "result of imperfect coördination, caused by disconnected and erratic discharges from the cortex."

Second. That this incoördination is between the nervous mechanism controlling the acts of vocalization and articulation and the centers having for their function the appreciation and expression of melody and harmony, and is due to a biologic variation in such a center or its commissures.

Third. That the cure of stuttering is only accomplished by a process of compensation brought about by the education of cells previously non-functionating, or by forcing the opposite hemisphere to supply a center similar to that which is imperfectly developed. To this end the reversal of dexterity would seem to be a reasonable procedure.

Delay in Acquisition of Speech.—Occasionally children will be found whose later development is normal in every particular, who do not speak until five or six years of age. When word-deafness can be eliminated the possibility of retarded development of the motor speech center or its association pathways (either functional or structural) should be considered.

In the care of the group of cases which we have been considering, the first requisite is a thorough understanding of the factors involved in the individual under observation. This understanding can only be reached through a thorough study, sometimes extending over a long period of time. It is then necessary that the child receive training suitable to his individual needs. This training should be directed toward the stimulation of the depressed centers and toward bringing them into functional relationship with other centers. This cannot be done in the ordinary class room. It requires, first, thorough examination by an expert who is able to determine the exact cause of the retardation and to advise regarding the subsequent training of the child. This training should be undertaken by a teacher who is also an expert in this particular line of work. To accomplish this special schools or special classes are necessary. These classes should contain but

a small number of pupils, the fewer pupils the better results to be obtained. The teachers because of the wider knowledge required should receive proportionally larger salaries.

Concerning nervous and unruly children much that has been said regarding the precocious child will apply. These children should also be studied carefully and the cause of the condition fully determined. The majority will fall into the classes already considered or into the next.

Those retarded because of physical defects, which can either be removed or counteracted.

That physical defects, such as adenoids, enlarged tonsils, eye strain, malnutrition, etc., have a decided influence upon mental development is well known. I will not lengthen this paper unnecessarily by detail regarding them. It is necessary first, to determine the defect or defects present in the individual case, and next whether the defect is responsible for the retardation, and whether it can be removed. The mere removal of the defect is as a rule not sufficient. Depressed intellectual centers must be energized and faulty mental associations corrected. To this end it is necessary that the child receive special training, until he can again take his place in the regular class.

Feeble-minded Children.—Neither the ordinary class room nor the special classes alluded to is the proper place for the feeble-minded child. He is not only a constant drain upon the patience and energy of the teacher, but is a hindrance to the progress of his fellows. The feeble-minded child himself, while possibly receiving a certain amount of benefit, must receive less than were he placed in a home or institution adapted to his needs. Feeble-minded children should never be placed in an ordinary class, and only in the special class for a sufficient length of time to determine whether they are essentially feeble-minded or only apparently so by reason of some of the conditions described above. There are undoubtedly many children who are now practically feeble-minded, who, had they been thoroughly examined in their earlier years and placed in special classes, would have been normal children at the present time. No child should be considered feeble-minded until thorough examination and study have proved him so. When such proof has been obtained, he should immediately be placed where he will receive training suitable to his needs, and where he will, under constant care and watchfulness, lead a contented and more or less useful life.

PREMIUMS FOR NURSING MOTHERS AND MILK DEPOTS FOR INFANTS.*

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Premiums have been given to nursing mothers for some years in France and Germany. The system has been most carefully worked out in Berlin, so that I shall briefly describe the method employed in that city as a type. Each nursing mother who presents herself regularly with her baby at the milk depot receives a sum weekly or fortnightly in advance not exceeding \$1.40 per week. The majority receive between thirty-five and eighty-five cents. The object of these premiums is to encourage breast feeding and to keep the infant under observation so that the mother may be instructed. In 1908 12,519 mothers were assisted in this way, receiving a total of \$37,500, or about \$3 to each mother. What were the results? Tugendrieck, who was director of one of the milk depots, believes that the number of breast-fed infants was slightly increased. Hugo Neumann, who has studied the subject for many years, is not enthusiastic and puts the method rather on the defensive when he says that from the observation of a large number of cases he has received the impression that the great expenditure of time and money has not been without some success, notably in those who presented themselves during the first month. Behrens and Schiller of Carlsruhe, who have had several years' experience with the method, conclude that the percentage of breast-fed infants has not increased; but the duration of lactation has been somewhat lengthened. Leaving entirely out of consideration the question as to whether it is advisable to give a reward for what is usually accepted as a maternal duty, do the results justify the great expenditure? I think not. It is admitted by all that the mothers stay away from the depots as soon as the premiums are stopped; that is, they have not been educated to an appreciation of the value of regular medical supervision. What

* Read before the Section on Pediatrics of the New York Academy of Medicine, March 9, 1911.

happens? A mother is paid for nursing her first baby; she has a second and a third; she must be paid again and again. If she was really educated she would profit by her first experience and would come to the depot of her own accord. The money which is supposed to be used for improving the nutrition of the mother is often used by the father for alcoholic drinks or to pay rent and debts. Even with this great expenditure the length of time that it was possible to keep these mothers under observation was comparatively short, from seven to eighteen weeks. It seems to me that the money could be spent to much better advantage in the employment of visiting nurses. Such a nurse receives \$75 a month, that is, approximately \$3 for each working day. In a well-populated district a nurse can usually make fifteen calls a day, so that the expense of a call is about twenty cents. As these mothers received from forty cents to \$1.40 a week, from two to seven calls could have been made at the same cost.

Milk depots as at present established may be divided into two groups: (1) Those which simply distribute milk and (2) those which in addition to the distribution of milk have medical supervision of the infants under their care. All are agreed that the first type are of little or no value. It is only necessary to emphasize the fact that they may be positively harmful by diminishing the number of breast-fed infants. The second type is the usual one. The babies are weighed and examined; and the mothers are instructed. There is no corps of visiting nurses; or, if there is, the number of nurses is inadequate. Again, taking Berlin as a type of this class, the first milk depots were established in that city in 1905. There are now seven. In 1908 there were 49,902 infants born; 18,114, or about one-third of these, were under observation at the milk depots for a shorter or longer time. These depots were all under the direction of well-known pediatricists, so that there can be no doubt that they were conducted in the best possible way. What were the results? Tugendreich sums up as follows: "When we consider the small number of institutions, the small attendance at many places, the short period of observation, which in many cases does not admit of any beneficial effect, it is not difficult to understand that a marked success of the depots is not perceptible, and that there is no distinct reduction of the infant mortality. It is not the fundamental idea that is at fault, but the incomplete and imperfect carrying out of the plan. "It seems to

me that when we consider that these depots have been in operation for several years, that in 1908 18,000, or one-third of the infant population, was under observation for a shorter or longer time, and that \$37,500 was spent for premiums alone, we should expect some noticeable effect on the infant mortality. To what is this failure due? Principally I believe to two causes. First, the infants have not been obtained at the start. Usually not more than 25 per cent. come to the depot during the first month of life. Just at this time the mortality is exceedingly high; those that come represent to a certain extent the survival of the fittest. In many cases when the mother comes to the depot breast feeding has already been stopped. Secondly, and perhaps still more important, those that need the attention and instruction most do not come at all. They *will* not or they *cannot*. They are not all ignorant; many have duties at home which absolutely prevent their going. Then there is the time spent; the waiting, and the carfare. The baby or the mother may be sick. The baby may be premature; or, during the winter, the mother may not wish to expose it. For all these reasons the services of a corps of visiting nurses is essential. The nurse visits the home shortly after the birth of the child and instructs the mother; every effort is made to keep the baby at the breast. The proper teaching of the nurse counteracts the improper teaching of neighbors. At the depot the large number of mothers and the noise are apt to make some impatient and nervous. In the quiet of the home each mother can be given individual instruction with very much better results. The number of visits to the depot can be regulated according to the necessities of the case; some may require several a week, others only one a month. In this way the mothers can be spared unnecessary trouble and loss of time, and the congestion of cases at the depot can be prevented; those that really need attention will get it. It is practically impossible to weigh and examine 50 babies and to instruct 50 mothers in two hours, as is sometimes attempted. In the case of an illegitimate infant the nurse will often be able to keep mother and child together either at the place at which the child was born, with the grandparents, with another family, or in a convalescent home. The baby will then receive what it needs most, breast feeding and a mother's care.

During the last two years I have carried out an experiment which I should like to describe briefly, as it has a direct bearing on

the subject under discussion. From June 1, 1900, to June 1, 1910, 172 infants were born in the maternity ward of the Lebanon Hospital. About one-half of the mothers applied a short time before delivery at the hospital or at the dispensary, where they were examined and given instruction. After delivery in the maternity ward, they were instructed in the care and feeding of infants, especial emphasis being placed on the importance of breast feeding. In order to assist the memory a printed form was given to each mother containing a few of the most important points expressed in simple language. They were also given a card to the pediatric department of the dispensary, with the instruction that they should return to the dispensary within ten days after leaving the hospital, or in special cases sooner. If they did not come at this time or later for the regular monthly visit a postal card was sent on a printed form; and if they failed to respond to this a visit to the home was made. I do not consider this the best method, but the circumstances were such that we were compelled to adopt it. Sick babies were to be brought to the dispensary immediately; those that were very sick were referred to the babies' ward of the hospital. In this way at least one life was saved by obtaining breast milk from the maternity ward for a very atrophic infant. From the experience gained from this experiment I should like to emphasize the following: (1) The importance of giving the mother instruction from the start. (2) Of fourteen deaths, seven occurred during the first month of life; and of these five occurred during the first two weeks. Therefore, anyone who expects that after the establishment of a milk depot in a district the infant mortality will be reduced more than two-thirds is sure to be disappointed. (3) The milk depot should be associated with an outpatient department for treating babies that are slightly ill; and a hospital ward for those that are very sick. Breast milk should be provided for special cases. (4) From 75 to 80 per cent. of these mothers are able to give the breast for five or more months. Of the remainder, very few are too poor to buy a quart of bottled milk. They can easily be taught the simple modification of such milk. It is not necessary to distribute modified milk. (5) For the majority of cases, one visit a month to the depot is sufficient. For special cases, more visits are necessary.

The city need not try the very expensive experiment of providing a special milk for infants. The cost of distributing modi-

fied milk at depots is enormous; at Carlsruhe it amounted to one-half the total expenditure. The comparatively small percentage of mothers who must be given pure milk can be much more economically provided in other ways. The best charity is said to be that which teaches the poor to help themselves. If the mother learns to prepare the food herself, she is, to a certain extent, independent, and can, at some future time, utilize the knowledge gained.

CONCLUSIONS.

(1) Premiums to nursing mothers are unnecessary. The results do not justify the expenditure. The money can be used to better advantage in the employment of visiting nurses.

(2) Depots which simply distribute milk are of little or no value.

(3) Depots which, in addition to the distribution of milk, are under medical supervision, but have no adequate corps of visiting nurses, are of limited value.

(4) The visiting nurse is essential in order to (a) get the infant at the start; (b) keep the mother and child together; (c) keep the infant at the breast; (d) reduce the number of times which it is necessary for the mother to visit the depot; (e) give individual instruction in the quiet of the home.

(5) It is not necessary to distribute modified milk at the depots. From 75 to 80 per cent. of these mothers can nurse their infants for five or more months if properly advised and encouraged from the start. Most of the remainder can buy a quart of bottled milk, and the few who are unable can be much more economically provided with pure milk by other methods. The modification is taught the mother by the visiting nurse.

(6) The emphasis should be placed on the importance of breast-feeding, not on the distribution of cow's milk of good quality.

250 West Eighty-eighth Street.

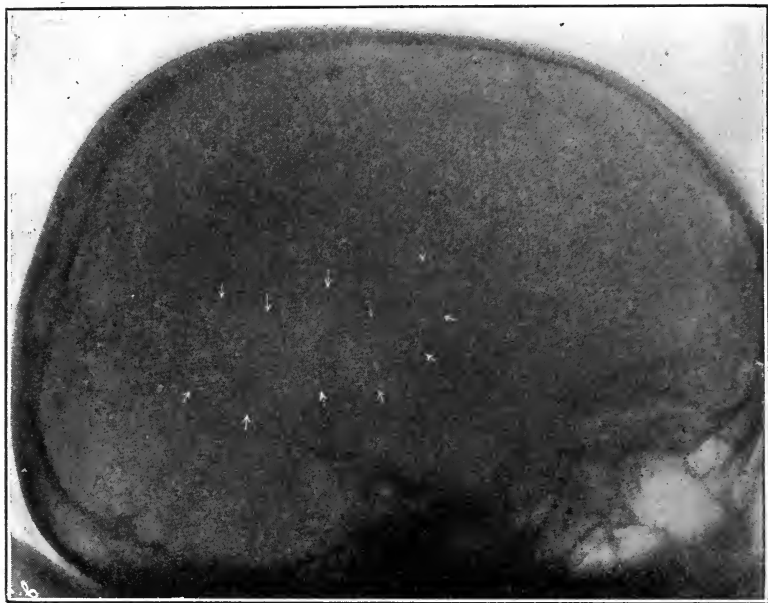
CASE SHOWING SYMPTOMS OF INTRACRANIAL PRESSURE WITH RECOVERY.

BY H. LOWENBURG, A.M., M.D.,

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On November 26, 1909, I was called to see I. L., male, aged eight years. His mother informed me that he had been suffering from headache for the past ten days. The pain was so intense that it had prevented sleep. Nothing gave relief and the child had vomited and had been intermittently nauseated. He was pale, had an anxious expression, complained of feeling chilly, was slightly cyanosed and lay in bed whining in a crouched position. He resented each slight interference with his position, wanted to be left alone, and even the speech of those around seemed to increase his head pains. Examination was therefore conducted with difficulty. It was noticed that his head was unusually large, the circumference measuring 23 inches. The shape of his head resembles his father's. I was informed that the boy was born with a big head and that the labor had been hard and instrumental on this account. He was a mouth-breather, and examination revealed adenoids. His pulse was slow, but the exact record has been lost. His temperature at 4 P.M. was 95° F. in the mouth. Heart and lungs negative. The record of his reflexes has been lost but they presented nothing unusual. He was given calomel and a small dose of codein sulphate, which temporarily relieved his pain and permitted some sleep. Within twenty-four hours the head pain returned with all its intensity. He was then removed to the hospital for observation and the removal of his adenoids. Examination of blood, urine and feces gave negative results. As was expected removal of his adenoids gave no relief. The report of his eye grounds examination made by an ophthalmologist, whom I will designate as "A," follows: "November 29, 1909. Examination made of boy while in bed in the hospital. Pupils equal, media clear, optic discs clearly outlined, of normal color, vessels full but showing no evidence of central pressure." The boy was then taken from the hospital unimproved and within eight days his parents took him to another ophthalmologist, whom I will designate as "B," and whose report follows: "December 6, 1909" (eight days after "A's" first examination), "patient visited my office. Ophthalmoscopic examination showed double optic neuritis 6° F. R. E. pronounced optic neuritis showing Stauung's papilla. L. E. pronounced optic neuritis. Hemorrhage on nasal side with white spots. Veins dilated, arteries

thin." He was insistent in his statement that the boy was suffering from brain tumor and advised a consultation with a brain surgeon with a view to a performance of a decompression operation to save the boy's vision if not his life. The parents in alarm returned the boy to me and I sent him back to ophthalmologist "A" without comment as to the findings of "B," simply asking for a re-examination. "A's" second report, made the next day



The arrows point to area of greater transparency.

and nine days after his first examination, follows: "December 7, 1909, R. E. media clear; veins full and tortuous; optic disc hyperemic; no hemorrhage but remains of extravasations of blood. L. E. media clear; disc with blurred edges; veins markedly tortuous, previous hemorrhage; no fresh hemorrhages found. V. = R. E. 6/7.5; L. E. 6/7.5 (?)." It will be seen then that these two ophthalmologists, both men of distinction and great skill, were in accord as to the presence of optic neuritis, the apparent discrepancy being due simply to the fact that when "A" first examined the eye grounds they were normal and that the optic changes were rapid, occurring within eight days after "A's" initial examination.

The boy's head was then skiagraphed by Dr. G. E. Pfahler,

whose report follows: "The X-ray examination made of the head of I. L., December 7, 1909, showed a comparatively thin calvarium. In the region of the lateral ventricle, especially on the right side, there is an area of increased transparency 8 cm. long and about 2.5 cm. wide, but very irregular in outline. The border of this shows a number of irregular denser areas. This might mean a thinning of the bone due to the pressure of a new growth or it might mean an unusually large lateral ventricle. There is a similar appearance on the left side though less distinctly shown. I can make no definite diagnosis."

The family history threw no light on the case. The father denied venereal diseases. The parents were married nine years. There had been two children born at term, and there had been no miscarriages. The facilities for making a Wassermann test were lacking.

Not being able to arrive at a definite conclusion as to the cause of the intracranial pressure the boy was placed upon 5 grains of iodid of potash and $1/24$ of a grain of the bichlorid of mercury, four times a day. His symptoms gradually disappeared, and to-day he is completely well; is of average intelligence and is doing well at school. A report of the examination of his eye grounds made recently, *i.e.*, a year after the onset of his illness, by his two ophthalmologists, follows: "A" says "examination December 10, 1910—one year later—media clear; optic discs normal; both veins and arteries full and tortuous; some exudation surrounding left optic disc from the remains of previous inflammation." "B" says "patient again visited my office November 19, 1910. Found eye grounds practically normal. Vision R. E. 20/20, L. E. 20/30."

The symptoms and physical findings in this case undoubtedly point conclusively toward increased intracranial pressure as the cause of the head pains. It appears impossible to accurately define the lesion or its location as there were neither palsies nor local convulsions. The history of a comparatively sudden onset assists in excluding a solid growth. A retrospective view of the case seems to point toward one of two conditions—specific disease or an acute exacerbation of a chronic or rather an arrested internal hydrocephalus. The former is a possibility on account of the successful outcome which might be attributed to the effect of the iodid and mercury. The latter seems the more likely in view of the sudden onset of the head and eye symptoms and the X-ray examination. It is not at all unlikely that the iodid of potash did good also if this were the condition present.

DELIRIUM TREMENS IN A BOY OF TWELVE.

BY CHARLES F. LEWIS, M.D.,

Austin, Minn.

An intoxication in a child due to an accidental or purposeful ingestion of alcohol (the latter too often, I regret to say, encouraged by a certain class of parents) is scarcely to be considered a rare incident. The case which I am about to cite, however, is of such a nature as to provoke comment, both from the fact that a distinct hallucinatory delirium was in evidence, but also from the fact that it was caused by drinking a beverage not commonly mentioned in connection with such an acute mental excitation, and is therefore somewhat rare.

R. C., a boy aged twelve, parentage Norwegian; reasonably healthy and robust since birth, with the exception of some skin infectious trouble four years ago and measles. An internal squint has been present since the age of two. Upon his return from school at four-thirty P.M. December 9th, 1910, he was sent to the store about three-quarters of a mile distant for two quarts of apple cider. The clerk states that while at the store he drank a cupful of cider, not more. He returned home in time to eat supper with the family at six o'clock, having taken no more cider since drinking the cupful at the store. He drank less than a cupful after reaching home. The family's suspicions were aroused by his strange actions and the cider was thought of as the cause. He complained of dryness of the throat and mouth. Confusion began to be manifest in his actions and conversation. These symptoms gradually increased, according to the mother's statement, until eleven o'clock, when I saw him. I found him extremely nervous, restless, irrational and of his speech one could scarcely draw a single connected sentence. His hallucinatory confusion was varied; one moment he considered himself roller-skating, the next he was playing marbles, eating candy, smoking cigarettes or reaching for imaginary objects. He claimed he heard music and voices.

I saw him again twelve hours later. Large doses of bromides had failed to quiet him and he had not slept. Hallucinations were still active. The chief one at this time (about mid-day) was that a neighbor's hay-stacks (about one-half mile away) were burn-

ing, and he said he could see the neighbors fighting the fire. He was constantly running to the window or attempting to get out of doors to see this imaginary fire. His coördination was very imperfect; he stumbled over various objects, misjudging distances, and nearly fell when attempting to lean against the door-casement. His pupils were dilated, tongue steady, but there was a marked tremor of the fingers. He was disorientated for time, place and persons. He did not tell correctly the time of day, the day of the week or the month of the year. He thought he was having a vacation from school, at times did not properly interpret his surroundings, and called the members of his family by names not theirs. When questioned he could tell objects by their right names, and told his name correctly. In all, he was without sleep for thirty-four hours after taking the cider, and was nervously active during that time. After the administration of stronger hypnotics he slept from four o'clock A.M., December 11th, for eleven hours and awoke in a normal condition.

For medication, hyoscin in doses of $\frac{1}{250}$ was exhibited every three hours after the second visit, and morphin, $\frac{1}{16}$ grain, was given at nine and twelve on the second evening.

Delirium tremens is rather to be considered among the rarer afflictions of children. A few cases are reported in the literature, most of them resulting from the generally considered intoxicating liquors. Madden reports a case in a boy of eight who nearly emptied a bottle of port wine. He cites a case, also, of a boy aged eight, who was rewarded with a "sip" of whiskey by his mother, who had sent him to procure the liquor for her. Moorehead quotes Griffith's case of a boy of seven years, hallucinations developing on the fifth day and recovery.

The child's system is particularly susceptible to alcoholic stimulation. It is interesting to note that the hallucinations of this boy were concerning things interesting to a boy. In many of the cases coma and convulsions seem to play a part. That feature was absent in this boy. Madden's case nearly died of coma and was weak in mind and body for a month afterward.

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SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, Held March 9, 1911.

WILLIAM SHANNON, M.D., CHAIRMAN.

HEREDITARY SYPHILIS AND THE WASSERMANN REACTION, WITH 5 CASES IN ONE FAMILY.

DR. MARK S. REUBEN presented these patients and read a paper on this subject. (See page 484.)

DR. L. E. LA FÉTRA said he had asked Dr. Reuben to present these patients because the family history illustrated more points in relation to hereditary syphilis than any other he had met. The first husband presumably had the disease; the second husband gave a negative Wassermann reaction and presented no symptoms of syphilis. This was an exceedingly important set of cases and should be helpful to all. There were two points of particular interest. The first was the value of the Wassermann reaction in making a diagnosis of hereditary syphilis, even though there were no symptoms presented that were definitely syphilitic. The baby shown had had an ulcer at the anal margin, which was seen by several dermatologists at the Vanderbilt clinic, and they all thought the lesion to be tuberculous. However, they still adhered to the diagnosis of syphilis. Of course they had the advantage of knowing the family history. They found an enlarged spleen, and the epitrochlear glands were enlarged as well. The Wassermann reaction cleared up the diagnosis; this was not a case of tuberculosis, but one of syphilis.

The second point Dr. La Fétra wished to emphasize related to the Wassermann reaction in selecting wet nurses. While it would rarely be needed it might, in doubtful cases, be of decided help. Infants born of syphilitic mothers gave a positive Wassermann reaction in 99 per cent. of the cases; in only 1 per cent. did the reaction fail, certainly a very small percentage. If the reaction was present in either the baby or the mother, it would be wiser, notwithstanding the slight danger of the foster child, to look for

another wet nurse. In his opinion Dr. La Fétra thought it much safer to make use of wet nurses whose babies were over six weeks old; then the clinical examination would usually be all that was needed.

DR. HENRY KOPLIK said there was going on at present a great discussion in the foreign journals regarding the value of the Wassermann reaction. There certainly was a great responsibility placed upon the doctor in selecting wet nurses, especially for babies before the age of three months. The question was raised whether or not the Wassermann test should be taken as a standard in the selection of wet nurses, a very important matter. If this reaction could be taken and uniform results obtained, it would be, without doubt, a good thing. One observer, however, could state that it was positive in one case; another that it was only slightly so; and yet another that he was not sure. The discussion was still going on as to whether the Wassermann reaction should be taken, or whether the clinical symptoms presented should be alone taken in the selection of wet nurses. The question had not yet been developed to the extent that they were able to state with positiveness that it was of great value in the selection of wet nurses. Dr. Rudolf Fischl, an old friend of Dr. Koplik, after an experience of twenty-five years in the selection of wet nurses, stated that he had not seen one case where he had "passed" a wet nurse on clinical grounds where syphilis had developed in the foster child. Any clinician with his eyes open need not subject the children or mothers to this test. When a wet nurse was wanted, she was wanted badly. The time was premature in deciding upon the value of this test; its value might be decided soon, but they were not yet ready for it.

DR. CHARLES G. KERLEY felt that the danger of infecting these innocent children had been tremendously overestimated; he had selected wet nurses for over twenty years and he had never seen, in institutional work, one case that had become infected, and a very large number of wet nurses had been employed. Their children were placed on wet nurses without any elaborate examination of these nurses. Among hundreds of cases he only knew of but 1 case that had become infected with syphilis. He felt, therefore, that there was comparatively little danger from the use of wet nurses. Dr. Kerley was afraid, too, that if they subjected these women to the Wassermann reaction they would

soon have but a few wet nurses. In many instances, in which he had applied the Wassermann reaction, the women disappeared, and this was rather discouraging.

A DUODENAL TUBE FOR INFANTS.

DR. HESS read a paper upon the subject, and presented a tube with which he was able to gain access to the duodenum in infants ranging from two to fourteen months, and weighing as little as 7 pounds. This tube consisted of a simple rubber tube, to which a perforated leaden ball was attached. It acted by means of gravity, being so heavy that it entered the duodenum quickly within twenty to thirty minutes.

Dr. Hess showed X-ray photographs clearly showing the tube in the duodenum, and one in which the stomach was filled with bismuth and the metal end of the tube was below in the intestine. He also showed alkaline bile-stained duodenal juice, which is the characteristic juice of the duodenum, and which may be taken as a criterion that we have passed through the stomach into the intestine. This is the first time it has actually been shown that we could reach the duodenum in infants.

Dr. Hess said that he did not know as yet the value of this new method, but that it would have scientific value in investigating cases of malnutrition in infants or in therapeutic measures, and that in practice at present its general value seemed to lie in the diagnosis of pyloric stenosis, in which, if we entered the duodenum and obtained the characteristic juice, we could rule out the presence of a marked stenosis, and also in the feeding of infants who suffer from protracted vomiting where the tube could be left *in situ*, and the baby fed for some days in this manner.

DR. MAX EINHORN said that one year ago he had reported a case of stenosis of the pylorus in an infant three months of age helped by stretching the pylorus. Since that time he had had occasion to introduce the instrument he presented through the pylorus and into the duodenum. Dr. Einhorn presented his duodenal bucket and told of its value in ascertaining the permeability of the pylorus. He had also devised a duodenal olive for use in little children, which was for the purpose of determining whether or not the pylorus was permeable. The distance to the cardia was ascertained by means of certain measurements. After the introduction of the olive, it was left in a few hours and then with-

drawn; the distance from the lips to the bile stain was noted. If there was any regurgitation of bile, this showed on the thread portion lying in the stomach. Dr. Einhorn also had used a duodenal pump for infants and succeeded in obtaining duodenal secretion. There was a control test in infants; they were allowed to suck milk while the pump was in the duodenum. In a case of a three months' old infant, the instrument reached the duodenum in forty minutes, when clear duodenal fluid of a golden color was obtained. To make the test positive the little one should be given milk; while sucking you could withdraw pure bile without the admixture of milk.

With regard to stretching the pylorus, Dr. Einhorn said he had constructed a similar apparatus for children that he used for older people, and this he demonstrated. It was in fact a pyloric dilator.

DR. LOUIS FISCHER reported the case of an infant, three days old, with constant vomiting. Very active antiperistaltic waves were visible. These waves were most pronounced when the food reached the stomach. This condition persisted for over two weeks. Neither casein nor fat flocculi were found in the feces, the movements consisting of meconium plus jelly-like mucus. The Einhorn duodenal bucket was introduced, and left in the stomach over night. In the morning it was withdrawn by means of the silk cord to which it was attached, and it was seen that by the stained cord it had passed through the pylorus into the duodenum at least 7 centimeters. This yellowish or greenish stain was characteristic evidence that the pylorus was not stenosed; it eliminated the grave doubt of a pyloric stenosis. Subsequent events proved the correctness of the diagnosis. The infant made a complete recovery. The treatment consisted of daily lavage and rectal feeding.

DR. THOMAS S. SOUTHWORTH did not believe it was necessary to introduce the bucket presented to tell whether or not there was true stenosis of the pylorus; clinical evidences could be obtained; if there was true stenosis there would be no milk residue in the movements.

DR. HENRY KOPLIK said that the work described by Dr. Hess was of great interest, and Dr. Hess had added another weapon to the scientific work in this direction. There was one point, however, that Dr. Koplik wondered at, the confidence expressed at

the ability to get good results in cases of either apparent or real stenosis of the pylorus. Some years ago Dr. Koplik invented an illuminator, which he had since abandoned; it was for the purpose of illuminating the stomach and pylorus. If one had a case of so-called relative stenosis or even a real stenosis of the pylorus with its accompanying hypertrophy and spasm, one could feel the pylorus and study the case. He could not see how one could speak of treating these cases by dilatation with any such confidence as expressed. If the pylorus was sufficiently dilated to allow the beads to pass, he did not believe it was a case for dilatation. It should be remembered that there was a varied pathology and pathogenesis in these cases; therefore, in any case in which the bead can enter the pylorus did not call for any dilatation of the pylorus. One too should watch the stools and see if there was any milk residue present. Any pylorus that allowed a little amount to pass through had no spasm, but was relaxed. What Dr. Southworth had stated was a point well taken—examine the feces; one did not need to go further than that. What had been said regarding the value of these instruments that had been presented he thought was rather Utopian; Dr. Koplik doubted whether any man could say that he had passed such a sound from the mouth to the pylorus and through it in fifteen minutes; he doubted whether it had ever been done; certainly not in pyloric spasm or stenosis.

PREMIUMS FOR NURSING AND MILK DEPOTS FOR MOTHERS.

DR. CHARLES HERRMAN read this paper. (See page 518.)

DR. EDWIN BRADFORD CRAGIN said that one of the most important points to be emphasized was the value of breast feeding and the advantage of mothers coming to the milk depots still nursing their babies. The responsibility was thrown back upon the obstetrician, who should see that the baby was kept at the breast if possible until it got to the depot.

As the obstetrician looked at the problem, it was resolved into two factors: First, Did the mother desire to nurse her baby? Secondly, Were the mother's breasts fit to nurse her infant? So far as the first factor was concerned, much could be done by the obstetrician. It did not seem, however, that the giving of these premiums was going to accomplish a great deal. A great many women were opposed to nursing their babies because of the social

demands made upon them; at the same time, if they were told that nursing their babies was better for the uterus and pelvic organs, especially for one month after the delivery of their children, he believed many would consent to nurse their infants for this period of time; it being for their personal good.

Again, many of these women could then be persuaded to continue nursing their infant because it was doing so well on the breast.

So far as the breast was concerned, the question arose, Was it suitable for nursing? "One never can tell by the looks of a toad how far it can jump." One can never tell either how much a breast will give; a little breast may give a large quantity of milk. It should be remembered that much can be done to make a breast secrete milk in abundance and this Dr. Cragin illustrated by citing a case that occurred at the Sloane Hospital. The child was a full term ectopic; for nine days after its delivery no attention was paid to the mother's breasts; the woman naturally had gone through a serious operation and they did not think it was fair to her to nurse the child, at least for a few days. On the ninth day some attention was paid to the condition of the breasts and a very little amount of milk was noted. The breasts were then massaged every four hours and, on the twentieth day, a strong baby was placed at the breast. On the twenty-second day her own baby was nursed every four hours; on the thirty-eighth day the infant was nursed every two hours. After the forty-sixth day the breasts were well developed so that the child received no nourishment except from the breasts of the mother. In this instance the breasts were developed by massage, starting at a time when there was but very little milk.

Another factor of great importance in encouraging the secretion of milk, especially in those cases where at first it seemed hopeless even when massage had been given, was to place a strong baby to the breast and to administer at the same time certain malted preparations; this would help very materially in stimulating the secretion of milk in a breast that otherwise would be of no use. There were a number of breasts that could not be used entirely; Dr. Cragin believed that it was best, however, to use whatever breast milk could be obtained, supplementing if necessary. The obstetrician of to-day believed in using a breast that could be used and in not being discouraged even if at the start the breasts looked hopeless. Try to develop these breasts and

make them useful; anyway, use them in part; keep the baby on the breast if possible.

DR. L. E. LA FÉTRA said he was opposed to all measures that reduced the responsibility of the father or mother of the family for the care of the children they voluntarily brought into the community. There was too much of a tendency to do things for and give things to the poor. Except in rare cases of extreme destitution, food and money should not be given away; instead, careful instruction should be given with the baby as the text. Instruction did not pauperize, but helped to put the recipient in a position less apt to require assistance in the future. The encouragement of breast feeding was of the greatest value, and, in Dr. La Fétra's experience, nursing for six months could be carried on by from two-thirds to three-fourths of the women they saw at the dispensaries. The modification of milk at home for supplemental feeding, or mixed feeding, and for feeding after weaning, was perfectly satisfactory. It required time and patience to teach the mothers, but the effort was well spent and the results were most gratifying.

Dr. La Fétra was in sympathy with the conclusions presented by Dr. Herrman in his paper.

DR. JOSEPHINE BAKER said that she personally was opposed to the offer of premiums to nursing mothers, but she thought that possibly a form of industrial insurance might be devised which would relieve the mother from economic strain during those months when breast feeding of the infant was most important. Because the milk stations were primarily centers of instruction where milk was distributed, she thought that the name "Infants' Milk Station" was an unfortunate one, and hoped that something better could be devised, which would call attention to the educational side of the work as well as that of milk distribution. She approved the home modification of milk, as tending toward educating the mother and making her more independent of the milk station in case she moved from the vicinity. It was the intention of the Department of Health to furnish plain milk and to have the mothers instructed by the nurses in the methods of modifying for infant feeding.

DR. SIDNEY V. HAAS said that he agreed with the conclusions reached by Dr. Herrman. Five years ago he looked up the question of milk depots while he was abroad. These had been started

in Berlin about six months before, under the name of "Fursorge-stelle," with the distribution of money premiums to nursing mothers, although in Paris, where the idea was first tried out at the "Consultations des Nourrissons," the money premiums had at that time already been abandoned because of the unfortunate experience they had had with it. It was found that if one woman, because of her small income, received nine francs weekly, and another of a somewhat larger income received only five francs, when the latter learned of the larger sum received by her neighbor, she at once repaired to the "Consultation" and threatened to discontinue breast feeding unless her premium was raised. The work progressed more favorably without the premiums. The other organization in Paris at that time was the "Gouttes de Lait," an organization comparable to one of our large milk companies, with numerous stores at which milk could be obtained either at the regular price by anyone, or for half price, or for nothing. Tickets for the latter were obtained at the central office after careful investigation, requiring renewal each month. This concern was able to pay a large dividend in profits.

With regard to the milk stations, Dr. Haas thought that they were on the wrong track; nothing could be worse than to call them milk stations; the name implied where these women can get milk and which is paramount to stating that by using these stations breast feeding was not a necessity. Any name but milk station would answer. It seemed to him that they were designed to add to the infant mortality rather than otherwise, and they were going to create chaos instead of order. The organizations already existant should be utilized. There was no doubt but that these depots were of great value, a capital thing if the babies could be supervised and according to the methods outlined. He thought that money was now being wasted in paying rentals for these stations.

With regard to the procuring of physicians for such stations, they should be men trained by institutional work or other experience. The milk supply to these stations was open to much criticism; the cost of maintaining and distributing it here, for instance, was excessive. The milk should be approved; the milk sold by dealers should be under supervision.

A few years ago it was thought that breast feeding was a lost art; every woman who could not nurse her infant tried artificial feeding, and usually succeeded. Opinions had changed during

the late years, and because of the experience obtained; it had been found that from 70 to 80 per cent. of the babies could be breast-fed. It was important to impress upon the mothers that their infants should be breast-fed. Dr. Haas reported one instance in which the mother was enabled to nurse her baby after it had been weaned for ten weeks; at this time the only stimulation required was the baby's mouth.

DR. CHARLES GILMORE KERLEY said that in his experience he found that these women did not require much persuasion to continue the nursing of their children; they learned that the best thing for them to do was to nurse their babies. Dr. Kerley said he did not recollect a case within recent years where a young woman had refused to nurse her infant when she was able to do so.

With regard to the milk stations, he believed they were useless, and might prove even to be harmful if not supplied with adequate instruction. He had had eighteen years' experience with the out-patients on the East Side and he was impressed with the fact that not only did they need instruction but also that they were willing to receive instruction.

DR. HENRY KOPLIK said that all were apt to make mistakes in endeavors to carry out in America work such as was done in Europe. Many infants in Europe did not bear the same relationship to their mothers and fathers that they did in America. Dr. Koplik did not meet with mothers who were unwilling to nurse their infants; in fact those that came to him with no breast milk deplored this fact and often shed tears because of their inability to nurse their babies. In America, this reluctance to nurse on the part of the mother was a factor in the problem that could be left out, according to his experience.

With regard to the milk depots, he thought they had come to stay; there should be in attendance a physician whose duty it was to instruct the mothers how to give milk to their babies. These stations had done lots of good in the way of life-saving. The only milk depots that do harm were those without control. The milk depots had come to stay.

DR. GODFREY R. PISEK did not believe it was a question of any unwillingness on the part of the mother to nurse her child; often they could not nurse their children because of financial circumstances by which they were surrounded. In many cases they were

instructed by their attending physicians or midwives to discontinue nursing their babies, and then they resorted to milk furnished by the milk depots. They were therefore thrown upon the mercy of these milk depots.

Dr. Pisek agreed in the main with Dr. Herrman's conclusions, but he did not agree with everything he stated about the value of consultations. There was no doubt as to the real value of these consultations; the mothers were given an opportunity to study their infants not only as regards the clothing but as regards disease, and they looked forward with interest to the weekly consultations.

There was no doubt as to the value of the "follow-up" system and the conferences that were held. These mothers did not come because they felt the need of instruction but because the babies were failing or were very sick. Some years ago the depots with which he was connected gave milk in baby bottles, costing twenty-eight cents a quart to prepare. Now the mothers were instructed how to modify it; but he learned that it was only the exceptional mother who could be taught how to do this properly.

Another important point pertained to the education of the mothers, upstairs and downstairs; they could learn a great deal from hearsay, and they did. They discussed the nurses' visits.

In the distribution of the pamphlets for the instruction of mothers, it should be remembered that the personal equation counted. The only way to reach these women was through the doctors and nurses.

DR. THOMAS S. SOUTHWORTH said that if, as stated, there were thousands and thousands of children that were being fed on the bottle because there was no breast milk, this was the strongest argument in favor of sending out nurses to the homes to give advice about their feeding before they were entirely deprived of the breast milk. If the importance of breast feeding was better taught, so many of these children would not come to the milk dispensaries.

DR. EDWIN B. CRAGIN agreed with what had been so far said. It was the exception, not the rule, in his experience, to find a mother who was not willing to nurse her infant. The education of the public in this matter had borne fruit and the majority of women were not opposed to nursing their babies. It was the bridge whist fiend and those of that character who did not wish to

nurse their babies. Many of the women he met with were very anxious to nurse them and often with tears in their eyes expressed a desire to nurse them when told they were unable to do so. The percentage of those who were unable to nurse their babies in the higher walks of life was extremely large; but they did not do so because of any unwillingness on their part, but because they were unable to. This was one of the penalties of that kind of life. As many as 30 to 40 per cent. of such women were incapable of furnishing milk for their babies.

DR. CHARLES HERRMAN said that because of the birth certificates they could get information regarding these babies at the time of birth. Forty per cent. of the births in the Greater City of New York were in the charge of midwives, and their reports came of necessity to the Department of Health.

With regard to milk depots, at the Good Samaritan much good had resulted from their use; however, efforts were being made to produce better methods. This was, following up these children. There was no doubt that the milk depots should be conducted with the affiliation of proper instruction of the visiting nurses.

RÔLE OF CEREBRAL LESIONS IN INFANCY AND CHILDHOOD IN THE CAUSATION OF EPILEPSY.—M. L. Perry (*Medical Record*, February 12, 1910) says that cerebral lesions in infancy and childhood have a much more important influence in the development of epilepsy than is usually attributed to the condition, and that the importance of such cerebral lesions as a causal factor is second only to bad heredity. He calls attention to the frequency of unilateral attacks in epileptics and to the fact that quite a number of them have suffered at some time during infancy or childhood from attacks of convulsions characterized by an unusual amount of constitutional depression, and involving one side more than the other. It is maintained by some good authorities that most, if not all, cases of epilepsy, dating from an attack of some acute infectious disease, as measles or scarlet fever, have as their pathologic basis a cerebral lesion. Infantile convulsions appear clinically to be the cause of brain lesions, probably hemorrhage, and these in turn to give rise to the epileptic seizures. This emphasizes the importance of preventing or arresting convulsions in children.—*American Journal of Obstetrics.*

THE PHILADELPHIA PEDIATRIC SOCIETY.

March 14, 1911.

J. TERRANCE RUGH, M.D., PRESIDENT.

EDEBOHLS' OPERATION.

DR. E. B. HODGE showed the kidneys from a girl of eight years, removed at autopsy six weeks after a second double decapsulation. The patient was exhibited before the Society nearly two years after the primary operation in good health, with no albumin or casts in the urine. Six months later, following bronchitis, edema reappeared with albumin and casts. She recovered from this and several similar attacks, but spent about nine months of 1910 in hospitals, the last four months continuously in the Children's Hospital. As she was losing ground steadily, in spite of the care and attention of Drs. Griffith and Gittings, double decapsulation was performed the second time on December 1, 1910. The main clinical facts before operation were high grade edema, low urinary output (the daily average being 4 ounces) and lack of uremic symptoms. After operation the edema subsided, to return in less degree in ten days, accompanied by ascites. The patient was more comfortable and the amount of urine larger but never free from albumin or casts. At operation the fatty capsule stripped off easily, showing a condensed inner fibrous surface. No definite fibrous capsule could be demonstrated, even on incision of the cortex in several places in each kidney, although the primary operation was done nearly two and one-half years ago. Dr. C. Y. White reported that the microscope shows no definite capsule. There is, however, a two-third fibrous tissue-cell layer, probably newly formed capsule. The specimens show marked chronic parenchymatous nephritis. The left kidney weighs 154, the right 70 grams.

DR. E. E. GRAHAM said that, in 1905, he had collected 11 cases of decapsulation of the kidneys in children for nephritis. In only 1 had decapsulation of both kidneys been done a second time—in a boy of ten years with chronic nephritis. He did well for twenty-one months after operation; the second operation did little, if any, good. There was no report of death or recovery of

this case. A careful study of these cases shows that if the illness is acute or subacute, rapid improvement may follow decapsulation. Most of the reported cases occur in hospitals, and it is difficult to continue the proper treatment after the child leaves the institution. Dr. Graham's patient always improved after returning to the hospital. Many operators believe that a decapsulated kidney becomes enveloped in a much thicker capsule than existed previous to the decapsulation, from three to four months after the operation; this apparently did not occur in Dr. Hodge's case. Of his 11 cases 5 died and 4 probably recovered; 2 showed no improvement. All would probably have died without operation.

DR. HODGE answered, in reply to Dr. A. A. Eshner, that the first operation was undoubtedly life-saving. She remained well for over two years afterward. In well-selected acute cases the operation is certainly indicated.

ANTERIOR POLIOMYELITIS.

DR. R. S. McCOMBS reported a case of acute anterior poliomyelitis occurring in a child at five months of age. The permanent paralysis involved the right seventh cranial nerve, giving a typical right-sided Bell's palsy and the shoulder group of muscles of the left arm. The third cranial nerve was likewise involved early, but this paralysis cleared up. The case is reported on account of the very early age of the child and the peculiar distribution of the resultant paralyses. Dr. McCombs also called attention to the fact that in the epidemic of 1910 involvement of the brain had been observed more frequently than in previous years.

DR. J. H. MCKEE said that he had seen several similar cases last summer. He reported those cases in detail.

DR. HERBERT FOX said that while the New York report indicates that diarrhea usually is an early symptom, and this fact is noted in Dr. McCombs's case, it has been his experience in two epidemics that constipation is more common. Among 200 cases only 3 developed facial paralysis, which paralysis was accompanied by other paralyses. Dr. Fox has seen it in a child of three months. Monoplegia with facial paralysis is common, according to foreign reports, and facial paralyses rarely clear up in these

cases, although the monoplegia may disappear. The gentlemen who have just spoken indicate that the cases of cerebral involvement, or those of the Landry type, are more common now than formerly. This has not been Dr. Fox's experience. In Western Pennsylvania in 1907 there were many cases of encephalitis diagnosed as cerebrospinal meningitis, which naturally brought down the percentage of the encephalitic type. The greater familiarity with the disease during our last epidemic increased the number of recognized polioencephalitides.

Dr. Eshner said that as this facial paralysis was part of an acute poliomyelitis and of nuclear origin, it should not be regarded as true Bell's palsy, which is a peripheral paralysis.

DR. T. H. WEISENBURG said that he did not know of a case similar to that of Dr. McCombs, in which there was not only a palsy of the seventh nerve, but also of the third. In the recent epidemic he had seen more cases of cerebrospinal involvement than previously and thought it was especially severe. Such cases as this bear out the fact that poliomyelitis is not a disease of the spinal cord, but a general infection of the whole cerebrospinal system, and is further evidence that we will have to revise our pathology and include cases of so-called superior or inferior encephalitis of Wernicke. Dr. Weisenburg thought that the twitching in the facial distribution on the side opposite the facial paralysis at the time of its onset was very interesting and indicates that there apparently was an irritation of this nucleus, but this could be easily accounted for by the fact that these nuclei are so close together.

INTRACRANIAL PRESSURE.

DR. HARRY LOWENBURG showed a boy of nine years whom he had first seen when eight years old. (Report of this case on page 523.)

BRAIN TUMORS IN CHILDREN.

DR. T. H. WEISENBURG said that they were rare in childhood. In a collection of about 40, only 2 occurred in children below twelve, but quite a number occurred in young adults, especially girls, between fifteen and twenty years of age. Of the tumors seen in consultation or hospitals during ten years of neurologic practice, he had seen only 5 in children under twelve years, and

these were either glioma or tuberculoma occurring in the brain stem or cerebellum. The other forms of tumor are rare. Occasionally, as in one of his specimens, cerebrospinal meningitis may leave as a terminal phase an abscess in the pia, but this is most unusual. So far as symptoms are concerned, these do not differ from those presented by adults, with the exception that if they occur in children below four years of age the symptoms are difficult to elicit and we are dependent upon the demonstration of choked disc, the occurrence of Jacksonian convulsions and paralysis. Inasmuch, however, as most tumors occur in the pons or cerebellum there will be such symptoms as paralysis of associated ocular movement and incoördinate gait. Internal hydrocephalus occurs probably more often in children than brain tumors. The symptoms are those of general increase of pressure with choked disc, but a differential diagnosis from tumors cannot be made. It can be stated, however, that tumors generally cause death, whereas in internal hydrocephalus recovery can be expected either with or without treatment.

DR. W. S. CORNELL referred to a case, considered simply as a bad boy, in whom choked disc was found. Operation for intracranial pressure was performed and the greater part of the cerebellum protruded and was lost. The symptoms of badness disappeared and the boy lived for some time. Intracranial pressure undoubtedly affected the boy's temperament.

DR. WEISENBURG thought Dr. Lowenburg's case one of internal hydrocephalus, since the general symptoms of tumor with marked choked disc disappeared so rapidly. He had seen several such cases in children and adults, the symptoms disappearing, leaving only slight atrophy of the optic nerves. In closing the discussion Dr. Weisenburg emphasized the rarity of tumors in children, and the fact that they were either tuberculous or gliomatous and not gummatous, as is the opinion of so many.

NON-DIPHTHERITIC EXUDATES.

DRS. S. S. WOODY and J. A. KOLMER reported the results of study upon a series of cases treated in the wards of the Philadelphia Hospital for Contagious Diseases. (See page 500.)

DR. KOLMER added that Vincent's angina, which ought to be called Plaut's angina, could readily be diagnosed by a smear. The

spirilla seem to be later forms of the fusiform bacilli. It is very difficult to isolate pneumococci; they produce a peculiar ulceration of the uvula and buccal mucosa, especially with scarlet fever. Secondary infections may conceal diphtheria underneath.

DR. H. L. HULL said that smears made at the time of culturing readily show Vincent's angina. The pneumococcic exudate is easily detached, leaving a clean surface. A patched uvula should cause antitoxin to be given at once. The guinea-pig test will show the virulence of the bacilli found. A severe sore throat usually shows mixed infection; pain is not a prominent symptom in pure diphtheria.

DR. FREDERICK FRALEY said that in his experience fusiform bacilli were almost always found easily in smears from cases of Vincent's angina, but that the presence of spirilla alone could not be considered at all conclusive, owing to the numerous organisms of that type occurring in practically normal mouths.

DR. C. Y. WHITE stated that the laboratory of the Board of Health was always glad to tell physicians just what infection was found in cultures. Smears will gladly be examined, if sent to the laboratory with cultures.

DR. D. J. M. MILLER emphasized the necessity of culturing all sort throats; also the importance of making more than one culture in all cases. He thought the younger men should familiarize themselves with cultural methods, especially those who practice at a distance from laboratories and city Health Boards. Marked constitutional symptoms, such as fever, prostration, etc., denote mixed infection rather than pure diphtheria as much as pain does. How does Dr. Woody distinguish pneumococcic infections from other forms of sore throats? It should be extremely difficult because of the frequent presence of the pneumococcus in the throat and mouth. He suggested that it might be wise for Boards of Health to tell the nature of the organisms found in a culture and not to confine replies to positive and negative only.

DR. ELEANOR C. JONES spoke of an irregular case of diphtheria that had recently occurred in her private practice. The throat was generally injected, but there was no exudate on the tonsils or uvula, only a slight grayish film on the throat anterior to the pillars of the fauces. Cultures were pronounced positive both by the Bureau of Health and the bacteriologist of the

Woman's Hospital. Antitoxin was promptly administered, but it did not affect the throat condition, although it promptly relieved the general symptoms of the disease. Such a case is most embarrassing to the physician because of the uncertainty of the clinical diagnosis.

DR. A. H. DAVISSON said that the practicing physician will always be able to cite cases where the taking of cultures has placed upon him unlooked-for complications; nevertheless it is best and safest to always make use of so great an aid in diagnosis, and thereby regulate our treatment and care of the case. Especially should we regard cultures as the means by which we can control dissemination of infection.

DR. ALFRED HAND, JR., said that this paper was of special interest to those who could recall the time when the bacteriologic diagnosis of anginas was first adopted, which was also the time when antitoxin was introduced. The opponents of antitoxin, who could see no value in it, advanced the argument that the improvement in the death rate was really caused by a stretching of the realm of diphtheria, through the use of cultures, to include many mild cases which formerly would not have been called diphtheria. There was a certain amount of truth in this criticism, and it was really necessary to do as suggested by Dr. J. M. Da Costa in a private conversation about a case in which Klebs-Loeffler bacilli had been found: "If that case were diphtheria, then it seems to me we must revise our whole conception of the disease." So, while cultural diagnosis brought into diphtheria some mild cases, yet it probably, according to the author's results, excludes an equal number of cases clinically suggestive of diphtheria. If any defence of antitoxin were needed, an impregnable one would be found in the results of the cases sent into the hospital as diphtheria in which the cultures are negative, the antitoxin administered on admission protecting those patients from developing the disease to which their environment exposes them. Certainly in pre-antitoxin days the admission of several hundred negative cases into diphtheria wards would have had a decided influence in raising the death rate. And the fact that so many negative cases are sent to the hospital emphasizes the importance of culturing all cases of tonsillitis.

DR. WOODY stated that perforating ulcer occurred in severe cases of scarlet fever and was pneumococcic. The pneumococcic

exudate is thin, separated without difficulty and does not leave a bleeding surface. It is accompanied often by a peculiar pinkish or carmine color of the buccal mucosa and lips. The same carmine color may also be noted on the face and chest.

DR. WHITE added that the smears made from cultures sent to the laboratory of the Board of Health are kept for three months, so that any physician can find out the exact nature of his cultures. Cases such as Dr. Jones reports occur daily; a guinea-pig test would probably have shown virulent bacilli. These cases should be isolated as long as the throats show bacilli.

STUDIES OF THE DIARRHEA OF INFANTS.—Elie Metchnikoff (*Gaz. méd. de Paris*, January 1, 1910) believes that bacteria are of great importance in the causation of diarrhea in infants. To prove this he has experimented on rabbits, causing diarrhea in them, and later in chimpanzees, by injecting them with the infectious material from a case of cholera infantum. These animals were fed on the same materials which they had eaten with impunity before the experiments, and we may conclude that the food had nothing to do with the diarrhea; hence the bacteria must have caused the disease. It is the Gram-negative organisms that are found in these stools. The bacillus proteus is the most frequent. In rabbits and chimpanzees this bacillus was found in the stools and also in the blood. It is a truly pathogenic organism whose rôle in the diarrhea of infants cannot be doubted. We must now consider how it reaches the intestine of the child. It is rarely found in cow's milk, but is present in the feces of most animals, the upper layer of meats and cheese, and most vegetables, fruits and salads. From these it reaches the intestines of adults, and by contact with them is communicated to infants. Flies aid in this dissemination upon food. Proteus is well tolerated by adults, but causes diarrhea in infants. Preventive measures include not only pasteurization of milk, but sterilization of the hands of attendants, and careful washing of fruits and vegetables in boiling water, which kills this bacillus. The cleansing of streets and destruction of flies are also important.—*American Journal of Obstetrics.*

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. CHARLES E. FARR.

DR. S. FELDSTEIN.

DR. C. D. MARTINETTI.

DR. M. C. PEASE, JR.

DR. FRITZ B. TALBOT.

DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

SHURLY, BERT R.: AN INVESTIGATION OF POSTOPERATIVE CONDITIONS FIVE TO TEN YEARS AFTER INTUBATION. (*Annals of Otology, Rhinology and Laryngology*, December, 1910, p. 1,063.)

This article is a report of 30 cases in order to answer the following questions: Does intubation produce scar tissue or predispose to pathologic change in the larynx? Are there late sequelæ of laryngeal diphtheria? What is the condition of the lymphoid ring? What are the effects on the general susceptibility of the parts to other infections? Are there any remote effects from the antitoxin?

From the examination of these 30 cases from five to ten years after being intubated and who were of ages ranging from seventeen months to eleven years, these conclusions were drawn:—

(1) Intubation is required more frequently in children showing tonsillar hypertrophy; adenoids are also predisposing factors.

(2) No bad effects from the use of antitoxin were noted.

(3) Laryngeal paralysis is extremely rare after intubation.

(4) More attention should be given to nasal obstruction in young children.

(5) Scar tissue was observed in 2 cases but produced no loss of function.

(6) No laryngeal paralysis found.

(7) The pathologic effects of diphtheria on the tonsillar ring are numerous and aggravated; these children show a marked tendency to other infections and chronic inflammation of the respiratory tract.

S. W. THURBER.

SURGERY.

MISEROCCHI, L.: MOVABLE AND PALPABLE KIDNEY IN INFANCY. (*Rev. d Clin. Pediat.*, May, 1911.)

Miserocchi finds that congenitally ectopic kidney in infancy is extremely rare. One can frequently, however, discover a pal-

pable and movable kidney, and as occurs in adults this is more often found in females and on the right side. As to the cause of the affection one must exclude practically all the causes determining this condition in the adult. Probably ptosis is brought about by general weakness and torpidity in the migration of the organ caused by a low degree of vitality. C. D. MARTINETTI.

GRAVES, WM. P.: DIVERTICULITIS OF THE SIGMOID. (*Boston Medical and Surgical Journal*, March 16, 1911, Vol. CLXIV., No. 11.)

The author concludes:—

(1) The clinical significance of the acquired diverticula of the intestine has only recently been recognized.

(2) The acquired diverticula of the intestine are nearly always multiple and may occur throughout the length of the intestine, though most commonly in the sigmoid flexure. The diverticula of the large intestine are of more important clinical significance than those of the small intestine.

(3) The etiology of the formation of diverticula in the intestine is referable probably to an inherent local muscular deficiency. The most common predisposing factor in causation is the accumulation of fat on the intestine, as is shown by the fact that the majority of diverticula of the large intestine occur at the attachment of the appendices epiploicæ.

(4) The pathology and symptomatology of diverticulitis simulate left-sided appendicitis. Some cases are cured spontaneously without operation.

(5) The operative treatment of diverticulitis consists in general of drainage in the presence of abscess or gangrene formation. In favorable cases, resection of the bowel and anastomosis is indicated. FRITZ B. TALBOT.

BEER, EDWIN: CYSTOSCOPY AND URETHERAL CATHETERIZATION IN YOUNG CHILDREN. (*American Journal of Surgery*, March, 1911, p. 79.)

Beer introduces a new and improved cystoscope for children. It is made in two sizes, 15 and 18 French, and its optical arrangement is practically that of the Nitze. The shaft is short and strong and the instrument may be used for examining or for catheterizing. Beer has used the instrument more than a dozen times in children and finds that anesthesia must be frequently

employed, especially in boys. Indigo carmine solution should be injected to help in finding the ureter openings. Beer's youngest patient was a girl of fourteen months; the youngest boy was five years old.

CHARLES E. FARR.

MEDICINE.

GREEN, ROBERT M., AND SWIFT, JOHN B.: HEMORRHAGIC DISEASE OF THE NEWBORN. (*Boston Medical and Surgical Journal*, March 30, 1911, p. 456.)

The writers conclude, as a result of their study of 51 cases, that the parity and civil status of the mother, the fetal presentation, the duration of labor and the complications of labor and the puerperium are factors of no significance as predisposing or determining causes of hemorrhagic disease in the newborn. The seasonal incidence and the occurrence of hospital cases in groups tend strongly to confirm the theory of the infectious etiology of the disease. The earlier the onset of the disease, the worse its prognosis; after one week the prognosis becomes relatively, after ten days absolutely, good. Clinically the disease occurs in three fairly distinct types—the umbilical, the seromucous, the purpuric—which have an approximate respective mortality of 60 per cent., 50 per cent. and 22 per cent. The gross total mortality is about 50 per cent. The treatment should be directed toward local hemostasis and increase of coagulability of the blood. Gelatin and rabbit serum are agents of proved value. Quiet and isolation are indicated in every case. Blood transfusion is a promising procedure which deserves further trial. The ideal treatment has not yet been demonstrated.

FRITZ B. TALBOT.

BRENNEMANN, JOSEPH: PURULENT INFECTIONS OF THE URINARY TRACT IN INFANCY. (*Journal of the American Medical Association*, March 4, 1911.)

The author emphasizes the frequency of this serious condition. The diagnosis can only be made by repeated examinations of the urine for pus, as the constitutional symptoms are often absent. About 90 per cent. of the cases are in girls under one year of age, and the infection seems to take place, for the most part, in the summer time, following gastroenteritis. The bacillus coli communis is the cause. The severe cases show miliary abscesses in the cortex and are probably hematogenous in origin. The

great majority, however, show simply a catarrhal pyelocystitis. The prognosis is very favorable in the milder cases, if properly treated, and even the more severe cases are not hopeless, although the mortality is quite high. The treatment consists of rest, light diet, forced liquids, alkalies, and the urinary antiseptics, urotropin and salol. Improvement is slow, relapses are very frequent but ultimately the patients are all cured clinically. The author concludes that in every child with an unexplained continuous or intermittent high temperature a repeated examination of the urine for pus is imperative.

CHARLES E. FARR.

YOUNG, JAMES HERBERT: AN ANALYSIS OF 175 CASES OF INFECTIOUS DIARRHEA IN INFANTS. (*Boston Medical and Surgical Journal*, March 2, 1911, p. 299.)

The article is statistical and must be consulted *in toto*, as it is impossible to abstract.

FRTZ B. TALBOT.

SHEA, W. E.: VINCENT'S PSEUDOMEMBRANEOUS ANGINA.—WITH THE REPORT OF A CASE AND ITS TREATMENT. (*The Therapeutic Gazette*, February 15, 1911, p. 93.)

Dr. Shea reports a case of Vincent's angina. Microscopic examination of the serum after removal of the slough in the throat showed Vincent's spirochetæ in great numbers with the associated fusiform bacillus.

The clinical appearance of the lesion on the mucous membrane of the mouth and fauces is that of a necrotic pseudomembraneous area of a dirty grayish color. Upon removal of the membrane a bleeding surface remains. These ulcerations might easily be mistaken for ulcerative secondary syphilis or diphtheria, as the lesion presents a similar appearance to both of these diseases.

The fusiform bacillus and Vincent's spirochetæ are easily demonstrated by the "India-ink method" of Hech and Wilenko.

Sodium cacodylate was given in 2-grain doses by the mouth. The membrane was removed, and tincture of iodine was applied in full strength for two days. A 25 per cent. solution of peroxid was used six times a day as a mouth wash. On the following two days an application of 4 per cent. silver nitrate was used, and then the area was touched with a 10 per cent. silver nitrate solution daily, until the patient was discharged cured.

M. C. PEASE.

METTLER, L. H. THE DIAGNOSIS OF ACUTE ANTERIOR POLIO-MYELITIS. (*The Archives of Diagnosis*, January, 1911, p. 7.)

Dr. Mettler points out that while anterior poliomyelitis has long been regarded from the clinical side as an infectious disease, it is only recently that the fact has been established experimentally. The same infection lies behind a number of other clinical entities, thus minimizing the mere groups of symptoms, which have hitherto been regarded as distinct and separate disease.

The newer studies of anterior poliomyelitis have not advanced our knowledge as far as would at first appear. They have established its infectiousness and shown that it occurs in epidemics. Pathologically it is now known to be a vascular interstitial inflammation with mere secondary changes in the ganglionic cells. It is also certain that it is a much more widely distributed disease process than its name, anterior poliomyelitis, would indicate.

Dr. Mettler has adopted Wickman's classification, which is as follows:—

- (1) Spinal poliomyelitic form.
- (2) Ascending form, including Landry's type.
- (3) Bulbar and pontal type, involving the cranial nerves, with or without involvement of the extremities.
- (4) Cerebral or encephalitic form.
- (5) Ataxic form.
- (6) Polyneuritic form.
- (7) Meningitic form.
- (8) Abortive form.

There is not one characteristic system upon which a diagnosis can be made during the prodromal stages of the disease. A certain diagnosis can only be arrived at when the paralysis attacks individual muscles and is followed by atrophy of those muscles. In Landry's type death may take place before there is time for atrophy. The paralysis is of the flaccid type. There is loss of the related reflex. Early in the disease there may be indefinite rheumatic-like pains, but, on the whole, sensory disturbances are absent. In a few cases the cerebral symptoms may be most prominent, the paralysis being slight or entirely absent.

In conclusion Dr. Mettler cautions against the adoption of a new name before the nature of the infective agent is known. In the meantime the diagnosis must depend upon physiopathologic methods, but it should be held in mind that these different clinical forms are one and the same process.

M. C. PEASE.

SMITH, R. M.: SILVER NITRATE IRRIGATIONS IN THE TREATMENT OF INFECTIOUS DIARRHEA IN INFANTS. (*Boston Medical and Surgical Journal*, March 2, 1911, p. 298.)

During the last season at the Boston Floating Hospital colon irrigations of 3 per cent. silver nitrate were employed in the treatment of infants ill with infectious diarrhea. The technic of the irrigation does not differ essentially from that of ordinary colon irrigations. It is advisable, however, to clean the rectum, and as much of the colon as possible, before using the silver nitrate solution. A cleansing irrigation with sterile water is given and continued until the water comes back clear. Salt solution should not be used for this preliminary cleansing, since the sodium chlorid forms with the silver nitrate an insoluble silver salt which is precipitated and the strength of the silver solution is weakened. When the cleansing has been completed one pint of a 3 per cent. silver nitrate solution is allowed to run into the colon and the tube then withdrawn. Some of the solution will be expelled, but no attempt is made to recover the entire amount used. In adults there is considerable pain after the injection, but none of these patients showed any marked evidence of discomfort.

The treatment was used at the Floating Hospital in 32 cases. In 4 of these the hospital record gives no account of the result. One patient was *in extremis* on admission and responded to no kind of treatment. One child was taken home within twenty-four hours, so nothing is known of its subsequent history. Twenty-six cases are left from which to draw conclusions. None of the patients were in any way harmed by the treatment. Three infants showed a rather severe reaction, but it was only temporary in character. In 22 of the cases treatments were given early in the disease. Eighteen of these were improved by the procedure, 11 markedly so, and 7 slightly. Six patients were given the injection late in the disease. Three, or one-half, were benefited.

FRITZ B. TALBOT.

KENDALL, A. I., AND SMITH, R. M.: DIARRHEA IN INFANTS ASSOCIATED WITH THE GAS BACILLUS IN THE STOOLS. (*Boston Medical and Surgical Journal*, March 2, 1911, p. 306.)

The writers conclude that it may be said apparently there exists a group of diarrhea in infants impossible to differentiate clinically from infectious diarrhea caused by the dysentery bacillus. These cases are associated with the presence of large num-

bers of gas bacillus in the stools. The bacilli occur in such numbers and in such relations that it seems reasonable to believe that they are the etiologic factor of the diarrhea. A simple method for detecting the presence of gas bacilli in the stools has been described by means of which it is possible within twenty-four hours to make a definite diagnosis of diarrhea caused by the gas bacillus. This diagnosis when made gives the indication for treatment with buttermilk. In the application of this method and the differentiation of this group of cases due to the gas bacilli, a distinct advance has been made in the diagnosis of diarrhea in infants.

FRITZ B. TALBOT.

PHYSIOLOGY.

HAWK, P. B.: FASTING STUDIES: ON THE CATALASE CONTENT OF TISSUES AND ORGANS AFTER PROLONGED FASTING. (*Journal of American Chemistry Society*, March, 1911, Vol. XXXIII., No. 3, p. 425. From the Laboratory of Physiological Chemistry of the University of Illinois.)

"Our experiments upon 'repeated fasters' have led us to the conclusion that the animal organism is in much better condition, from all observable standpoints, at the end of a second fast than at the end of the original fast, provided that during the intermediate period the animal be fed carefully and restored as nearly as possible to the physical condition in force before the initial fast. This is true even though the repeated fast be of longer duration than the original fast. We believe that an animal organism which has once been subjected to a severe fast acquires from this fact a kind of immunity or resistance which enables such an organism to more successfully cope with the problems of the abnormal fasting condition as they arise and that this and other associated factors permit the animal to regulate its varied activities more efficiently and to make a more economical utilization of the available body tissues. We expect to further investigate the question of a possible fasting immunity or resistance. Whether or not the suggestions as to the fasting immunity or resistance are generally accepted, the central and important fact determined by actual experimentation still remains. This is the observation that the tissues of an adult dog which had been subjected to two fasts, of 117 days and 104 days in duration respectively, possessed catalytic powers which were much more comparable with the

catalytic powers of normal tissues than with the catalytic powers of the tissues of another adult dog which had been subjected to but a single fast forty-eight days in length. Arguments against drawing any important conclusions from these facts may of course be adduced from the standpoint of individuality. However, in view of other related data already mentioned as obtained from repeated fasters, we are willing to stand upon our interpretation. That our data upon catalase values may properly be interpreted as indicating the efficacy of 'repeated fasting' is brought out still more clearly in connection with the work of Battelli and Stern in which they determined that the catalytic power of the tissues was an index of functional activity. On the basis of this finding, therefore, our observation of higher catalase values for the tissues of adult 'repeated fasters' as compared with adult 'initial fasters' may be taken as indicating the more efficient functional activity of the repeated faster." FRITZ B. TALBOT.

HYGIENE.

TAYLOR: BOYS' BACKS. (*The Psychological Clinic*, February 15, 1911, p. 274.)

The writer draws attention to the fact that until a boy is seven years old his back is almost always straight; at that time he begins to go to school and to take incorrect positions when reading or writing, which are the beginning of spinal curvatures. The responsibility for these deformities lies first at the door of the teacher, and second the parents who do not correct the improper positions. FRITZ B. TALBOT.

SCHAEFFER, JACOB PARSONS: THE SINUS MAXILLARIS AND ITS RELATIONS IN THE EMBRYO, CHILD AND ADULT MAN. (*Annals of Otology, Rhinology and Laryngology*, December, 1910, p. 816.)

This is a detailed study of forty pages in addition to sixteen pages of plates and, as applied to children, is best summed up in some of the author's conclusions.

I. The sinus appears during the third month of fetal life and may be duplicated, thus accounting for the accessory ostia seen in about 45 per cent. of cases.

2. Dentition seems to have but little influence on the size of the cavity.

3. The cavity enlarges by growth of the primitive sac and by absorption of the surrounding tissue. These two processes take place along with the growth of the face.

4. The cavity reaches its full size from the fourteenth to the eighteenth year.

5. Its average capacity is about 15 c.c.

6. The sinus floor is apt to be lower than the nasal floor.

7. The three molar teeth are in more constant relation to the floor than any other teeth.

S. W. THURBER.

THERAPEUTICS.

SZONTAGH, F.: CALOMEL AS A DIURETIC. (*Archiv. für Kinderhk.*, Vol. LV., p. 121.)

In cases of cardiac dropsy, the author found calomel to surpass almost all other diuretics. The usual dose was 0.1 three times a day. The author found this drug efficacious in cases where digitalis, strophanthus and caffein had no effect whatsoever or but a very transitory one. Symptoms of mercurialism were not seen. This drug is contraindicated in nephritis.

S. FELDSTEIN.

FRANCIONI, CARLO: ADMINISTRATION OF DIPHTHERIC ANTITOXIN BY THE SPINAL CANAL.

The author discusses this method of treatment, which he claims to have been the first to employ, in view of preventing the necessary dilution of antitoxin which takes place when the substance is injected subcutaneously. Brought in direct contact with the nervous system antitoxin acts rapidly and with satisfactory results. In the Florence Clinic to which Francioni belongs, only 2 cases showed symptoms of spinal irritation, and these disappeared in a few days completely. As a matter of fact any intraspinal injection of 3 to 20 cm. of any serum causes a slight amount of irritation. The author has not yet completed his statistics on the subject, but believes this new form of treatment to be of great value, not only in serious cases which will not yield to ordinary

methods but in cases of incipient diphtheria. Paralytic lesions in patients are very rare indeed following spinal injection.

C. D. MARTINETTI.

INFANT FEEDING.

HALBERSTADT, R.: IDIOSYNCRASY OF THE INFANT TOWARD COW'S MILK. (*Archiv. für Kinderhk.*, Vol. LV., Parts 1 and 2, p. 105.)

The symptoms as observed in one or another of 5 infants were apathy, collapse, vomiting, subnormal temperature or fever, diarrheal stools, loss of weight and anorexia. These were brought on by whole milk mixtures, buttermilk, cow-whey mixtures, and mixtures of the constituents of cow's milk without its whey. All the infants were below par. In several cases previous feeding with cow's milk was well borne, but when after a period of nursing cow's milk was again given, the symptoms of the idiosyncrasy immediately followed. These infants can gradually become accustomed to cow's milk. All the infants were below weight from birth, showed insufficient gain of weight on the breast or suffered from exudative diathesis. The author considers this condition a symptom of a congenital anomaly shown in the form of a transient alimentary anaphylaxis.

MICHEL, CHARLES: GOATS' MILK AND ASSES' MILK FOR INFANTS. (*Rev. d' Hygiene et de Med. Infant.*, No. 6, 1909.)

After an extensive series of investigations, Michel reaches the following conclusions in regard to the value of the milk of goats and asses in infant feeding. Goats' milk is very similar to that of the cow, but has not been proved to be so easily digestible. It can be substituted for cows' milk, however, and we must remember the comparatively complete immunity of the goat to tuberculous infection. This milk varies also frequently in composition.

Asses' milk contains far less fat and is easily digested by small and dyspeptic infants. Should not be used after two months of age.

C. D. MARTINETTI.

TALBOT, FRITZ B.: TWO METHODS OF OBTAINING HUMAN MILK FOR HOSPITAL USE. (*Boston Medical and Surgical Journal*, March 2, 1911, p. 294.)

The writer describes two methods of obtaining human milk: (1) that of having wet nurses live at a hospital and (2) that of having a trained nurse collect the milk from nursing mothers in their own homes. Both methods have been used successfully in hospitals, the former in the Hospital of the Massachusetts Infant Asylum, and the latter in the Boston Floating Hospital.

FRITZ B. TALBOT.

CHAPIN, H. D.: THE NUTRITION OF THE FEEBLE INFANT. (*Journal of the American Medical Association*, October 22, 1910, p. 1,459.)

Dr. Chapin points out that the proper nourishment of the feeble infant is a problem that taxes the resources of the most skillful pediatricist.

I. *The Motility of the Stomach.*

In feeble infants the weak action of the stomach, especially in its muscular power, is the source of much trouble. Nineteen atrophic infants were studied with great care. Out of the 19 cases only 6 could be shown to have approximately empty stomachs at the end of three hours, and of these 6, 5 were more than holding their own. The point is made that these children are, as a rule, fed at too frequent intervals, with the result that there remains in the stomach a residuum of fermenting food, which contaminates each successive feeding. This constantly recurring contamination and overburdening of the stomach results in fermentation, and in time leads to gastric dilatation with a loss in tone of the muscular coats of the stomach. Feeding should be so spaced as to allow the stomach to completely empty itself before the next feeding.

II. *The Form and Quantity of the Food Elements.*

"There may be few who realize that at least twelve different forms of proteids, five different forms of carbohydrates and two different forms of fat are used successfully in infant feeding, and the digestive properties of these food elements are modified by the combinations in which they are offered." The method to be employed in feeding a difficult case will have to be determined by

experiment with the individual case. It will often be found that the difference between success and failure lies more in changing the form and even the flavor of the food than in a profound knowledge of calculating theoretically indicated mixtures.

III. *Finkelstein's Method of Feeding.*

The principles of the new method are summarized as follows:—

(a) The cutting down the amount of the milk sugar and of the salts.

(b) In place of this, casein is added and a not inconsiderable amount of fat.

(c) A further bettering of the condition of the child is sought by substituting other forms of carbohydrates for the milk sugar, which tends to increased tolerance.

The food was prepared by separating the casein from 1 liter of milk. The curds are pushed through a fine sieve to break them up and then added to a half liter of water. Half a liter of buttermilk without sugar is then added. The following is the estimated percentage of the ingredients:—

Protein	4.5	per cent.
Fats	2. to 3.5	" "
Sugars	1.5	" "
Salts	0.3	" "

This method of feeding was tried on 20 cases in the Post-Graduate Hospital. Nearly all of these cases were not doing well on other feedings and many of them were in some stage of atrophy. The result in this series was not very promising. Altogether, 8 cases gained slightly in weight and 12 lost in weight on the Finkelstein feeding. It appeared that any benefits which followed the use of this feeding was more due to the form in which the protein was given, the casein being in a very finely divided state, than to the lessened amount of sugar.

IV. *Hygienic Management.*

This is most important. These patients require an altered environment that will furnish plenty of fresh air, good general hygienic and individual care. Dr. Chapin advocates boarding these children in country places, if necessary under the care of a foster mother.

MISCELLANEOUS.

CIRCULAR ISSUED BY THE AMERICAN ORTHOPEDIC ASSOCIATION
AND THE AMERICAN PEDIATRIC SOCIETY IN REFERENCE TO
ACUTE EPIDEMIC POLIOMYELITIS.

Anterior poliomyelitis is, so far as known, a communicable disease, being communicated from one patient to another and also by means of a third person. It occurs in epidemics and tends to spread along the lines of greatest travel. There is reason to believe that it is prevented from spreading by quarantine, and with the very great prevalence of the disease in the summer of 1910 it is the opinion of this committee that it is essential that it should be made a reportable disease in all states, in order that its presence may be detected and its spread guarded against.

Of particular significance are the so-called abortive cases, where indefinite ailments occur in children in communities where frank paralysis also exists. These abortive cases of infantile paralysis are undoubtedly a source of infection, and their record and study is of much importance. In a community where cases of infantile paralysis occur cases of illness with sudden onset of fever and meningeal symptoms should be closely watched and regarded as possibly infectious. In such cases even recovery without paralysis does not establish the fact that the case was not abortive infantile paralysis.

All cases of infantile paralysis should be strictly quarantined, sputum, urine and feces being disinfected, and the same rigid precautions being adopted as in scarlet fever. This quarantine should, in the opinion of the committee, last for four weeks in the absence of definite knowledge as to when the infection ends. Children from infected families should not be allowed to go to school until the quarantine is abandoned. The transportation or transfer of acute cases in public conveyances should be strictly forbidden. It would be very desirable to adopt provisional quarantine measures in suspicious cases in a community where an epidemic prevails. The report of all cases of infantile paralysis to the public health authorities should be enforced by law, and all deaths from this cause should be properly described and registered. A careful study of epidemics by public health authorities is strongly advised.

(Signed) ROBERT W. LOVETT, M.D., *Chairman.*
HENRY KOPLIK, M.D.
H. WINNETT ORR., M.D.
IRVING M. SNOW, M.D., *Secretary.*

BOOK REVIEWS.

LEHRBUCH DER KINDERHEILKUNDE FÜR ARZTE UND STUDIERENDE. Von Professor BERNHARD BENDIX. Sechste Auflage, S. 671. Urban & Schwarzenberg.

The sixth edition of this well-known text-book presents in compact form the science and art of pediatrics as it is taught in the leading Universities of Germany. The results of the recent work of Czerny and his school, and that of Finkelstein is presented clearly and succinctly. Finkelstein's nomenclature of the acute diseases of the gastrointestinal tract is adopted, while Czerny-Keller's classification of the chronic nutritional disturbances of infancy is likewise incorporated in this edition. In conformity with the practical character of the book, theoretical discussions and pathologic descriptions are given a minimal amount of space, while the details of treatment are presented with a fullness unusual in a book of this size. The illustrations, eighty-three in number, consist for the most part of fever and weight charts. A short but well-selected bibliography is given in footnotes and at the end of each important article. In the presentation of the subject the author has succeeded admirably in steering a middle course between the meager and unsatisfactory quiz-compendes and the cumbersome and not readily accessible handbooks.

LITORA ALIENA. By MEDICUS PEREGRINUS. Boston: W. M. Leonard, 1911.

These charming letters, written by a physician on his travels in Europe for the *Boston Medical and Surgical Journal*, show that in Boston at least the medical profession is not incompatible, even in these days of hurry, with an appreciation of beauty in nature and a fine literary feeling. Reading these letters on the rattling car or the thundering subway one is transported from new world crudity to old world staidness and quiet; and roaming with Medicus Peregrinus in Heidelberg, or near "dark Dundagil by the Cornish sea," our spirits are soothed and our day is sweetened and some of our dreams come true.

TRANSACTIONS OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA. Vol. XXXII. Philadelphia: Printed for the College, 1910.

This volume of the Transactions contains the papers read be-

fore the College from January, 1910, to December, 1910. There are twenty-eight articles, all of which merit careful reading, but of which four have particular interest to the pediatricist. These are: "Anterior Poliomyelitis," by Joseph S. Neff; "Some Recent Clinical Investigations of Poliomyelitis," by Charles K. Mills; "Recent Studies Concerning the Etiology of Epidemic Poliomyelitis," by Paul A. Lewis; and "The Surgical Treatment of Paralytic Talipes," by Astley P. C. Ashhurst.

DISEASES OF CHILDREN, FOR NURSES, INCLUDING INFANT FEEDING, THERAPEUTIC MEASURES EMPLOYED IN CHILDHOOD, TREATMENT FOR EMERGENCIES, PROPHYLAXIS, HYGIENE AND NURSING. By ROBERT S. MCCOMBS, M.D., Assistant Physician to the Dispensary and Instructor of Nurses at the Children's Hospital of Philadelphia. Illustrated. Second Edition, Thoroughly Revised. Philadelphia and London: W. B. Saunders Company, 1911.

This book, intended for the instruction of nurses in the care of children, will be of great value to physicians as well and quite worth while to have in one's library. As a text-book for nurses it fulfils its function admirably, being practical, direct, well illustrated and written from a sane point of view. The various types of disease are detailed from the physician's point of view and the application of nursing to them outlined. There are good chapters on feeding and therapeutics. It is an excellent book.

FEEDING IN CONVALESCENCE FROM SCARLATINA AND MEASLES.—Prosper Merklen (*Gaz. des. Hôp.*, January 4, 1910) gives it as his opinion that whenever a child has passed through a contagious disease which has modified his nutrition it is advisable to increase his food in value in order to build him up. Children from five to fifteen years of age no more than maintain their weight on a diet of 3.50 grams of albumen with a value of eighty calories. With a diet of greater heat value they increase in weight. These figures are higher than those generally given by physiologists for children of the same age in normal health. The author bases his assertions on the careful and systematic dieting and examination of 18 children recovering from scarlet fever, who were given in three groups milk diet, farinaceous and meat diet without salt, and the same with salt. The increase in weight was more satisfactory with the milk diet than with the other foods.—*American Journal of Obstetrics*.

ARCHIVES OF PEDIATRICS

JULY, 1911.

ROYAL STORRS HAYNES, PH.B., M.D.,
EDITOR.

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

SUMMER MILK STATIONS IN NEW YORK.

The summer of 1911 will probably be a notable one in the history of the fight against excessive infant mortality in New York. In years past the Department of Health has been active in giving advice by printed information, and by house-to-house canvassing. But this year a more systematic and comprehensive campaign is being carried on by means of Milk Stations. The purpose of these stations is not only the distribution of pure milk of a very high standard of purity, but also the instruction of mothers in the proper preparation of the food. Each week the baby must be brought to the station for inspection by the physician. It is stripped and weighed, the history of the week is obtained and recorded, and the instructions given for the future. Best of all, the nurse sees that the instructions are understood and carried out. At first the mother is shown how to modify the

milk, and then she does it herself, under the eye of the nurse. Advice is given as to the care of the baby, and its clothing, bathing and general hygiene. In short, when the mother goes to this substitute for the corner grocery, where she formerly bought deadly "loose milk," she receives pure milk, medical care for her baby, and the skilled instruction of a trained nurse.

In Manhattan the Committee for the Reduction of Infant Mortality of the New York Milk Committee has 27 stations in operation. Their station at 73 Cannon Street, which is in a very congested Hebrew quarter—the population of the six blocks surrounding it is over 16,000—had 165 babies under two years of age enrolled three weeks ago, and another station has been installed two blocks away. Two others have also had to be opened to relieve the congestion, making a total of 30.

The Department of Health is operating 4 in Manhattan, and will soon open a fifth. The Diet Kitchen Association has 8 in operation. The Strauss stations, numbering 7, with 12 more in the various parks and recreation centers, and the 7 others carried on by various organizations bring the total up to 69.

Best of all, these various interests are working in harmony. An Association of Milk Stations has been founded, and with the financial assistance of the Sage Foundation, and the co-operation of the Commissioner of Health, statistics and data are being collected and distributed to each organization for their use and information.

The Committee for the Reduction of Infant Mortality is offering to coöperate with private physicians and dispensaries for the temporary feeding of their patients. The stations are in no sense dispensaries, for as soon as a baby becomes seriously ill it is immediately referred to the physician or dispensary which sent it. During the recent terrific heat in this city no baby under their care died, and surprisingly few became ill.

It is confidently expected that some very definite conclusions will be reached, and a permanent and effective programme mapped out for the future, as a result of the summer's campaign.

THE SPECIFIC BACILLUS OF SCARLET FEVER.

If Dr. Vipond has really found the actual causative agent of scarlet fever he is to be congratulated most heartily and his good fortune to be envied. Apparently he has satisfied, and more than satisfied, Koch's postulates, and has succeeded where as yet others have failed. True, his mode of attack was somewhat different from that of other observers, but it is unusual for an experimenter to deduce a conclusion and so readily substantiate it by experiment. The experiments will, of course, have to be repeated and verified before they can be accepted as final, but this work of Dr. Vipond and his associates has opened a new vista in the work of scarlet fever. Vaccines, antisera, prevention, cure are subjects which arise in regard to future investigation. The association of the streptococcus with the new bacillus in the blood of one of the particularly malignant cases is interesting and significant, explaining our previous ideas of the rôle played by that organism.

At the beginning of the year the ARCHIVES expressed the hope that some of the problems confronting the medical profession might be solved by some of its readers. This may be such a discovery.

MR. SMITH'S ARTICLE.

The short article by Mr. Henry Atterbury Smith was received too late to be accorded the place to which the excellence of the cause it represents entitles it.

The bill recommended by the Tenement Economies Society should speedily be made a law, and no influence inimical to its adoption be allowed to hinder what will bring to the babies better homes.

ORIGINAL COMMUNICATIONS.

SCARLET FEVER. PRELIMINARY NOTE OF ITS SPECIFIC MICROÖRGANISM.

BY A. E. VIPOND, M.D.,
Montreal.

Senior Physician Outdoor Department, Children's Memorial Hospital, and the Montreal Dispensary; Physician to the Protestant Infants' Home.

At the annual meeting of the British Medical Association, held at Toronto in August, 1906, I read a paper entitled "The Early Diagnosis of Infectious Diseases by the Recognition of the General Involvement of the Lymphatic Glandular System."

Upon that occasion I observed that the lymph nodes were enlarged during the incubation period of an infectious disease.

The portal of entry being the tonsil, the microörganism is carried to the lymphatic system, thereby producing a general glandular infection, with a congestion and enlargement of the different lymph nodes of the body. These observations led me to believe that the enlargement of the lymph nodes must be caused by some irritant, which, probably, was the specific organism of the disease.

I regard the lymph nodes as nature's incubators, where the bacilli rest, multiply and form the toxins which enter the circulation.

During the incubation period, as the specific organisms multiply, it will be found that the lymph nodes increase progressively in size.

For many years eminent bacteriologists have been examining the blood and cultures from the throat, with the object of endeavoring to demonstrate the specific organism of scarlet fever.

Dr. W. J. Class, of Chicago, in 1889 described an organism taken from the blood, throat and scales of patients suffering from scarlet fever, which resembled a large gonococcus.

Dr. Mervyn Gordon isolated a streptococcus from the tonsillar exudation, which is similar to the streptococcus conglomeratus of Kurth.

Dr. Klein has also been successful in isolating a streptococcus from tissues of patients suffering from scarlet fever.

Leonard S. Dudgeon, F.R.C.P. (in a system of medicine edited by Sir Clifford Allbutt and Humphrey D. Rolston in 1908),

states that it is impossible, however, at the present time to accept the streptococcus described by Dr. Klein as a specific cause of scarlet fever, any more than we can accept the coccus of Dr. W. J. Class; and that it is probable that the septic cases really represent an infection with the class of streptococci which produce similar results in other diseases.

The majority of investigators, however, incline to the opinion that in scarlet fever, as in small-pox, streptococci are present as secondary invaders, and are not the primary inciting cause. ("Text Book of General Bacteriology," by Edwin O. Jordan, Professor of Bacteriology in University of Chicago.)

In January, 1904, Mallory published his report on "protozoon-like bodies" found in 4 cases of scarlet fever. L. S. Dudgeon, however, has not been able to find the organism described by Mallory in fatal cases of scarlet fever. Jordan, in his recent work (1910), asserts that no constant cultural and morphologic characters distinguish the streptococci isolated from scarlet fever from those from other sources, and inoculation experiments made with cultures of scarlet fever streptococci have failed to reproduce the disease.

Whether the multiplication of the scarlatinal poison takes place in the blood or in any particular organ or tissue is unknown. ("System of Medicine," edited by Thomas Clifford Allbutt.)

Up to the present, therefore, the causation of scarlet fever still remains an open question, and all efforts to obtain the specific organism from the blood, throat cultures or the skin have been disappointing.

Having come to the conclusion, therefore, that the specific organism of scarlet fever would probably be found in the lymph nodes of the body, I hoped to find the organism in the form of a bacillus, inasmuch as diphtheria, which in many ways resembles scarlet fever, has a bacillus as a specific organism.

CASE I. Confining my work, therefore, entirely to the glandular system, on the 14th of April, 1911, I obtained from the body of a child four years of age (who died at the Alexandra Hospital of scarlet fever) a number of enlarged axillary and inguinal lymph nodes, from which I obtained the lymph. This lymph, under strict antiseptic conditions, was inoculated into a slant of agar, blood serum, and broth. Within a few hours a mixed growth developed upon the different media, part of which proved

to be *staphylococcus aureus*; and part a raised white growth, which upon examination turned out to be bacilli.

This bacillus, when isolated, proved to be of rapid growth and grew readily on all different media, including dextrose agar, glycerin agar, blood agar, plain agar, blood serum and broth. On dextrose agar a well-developed growth was observed within four hours.

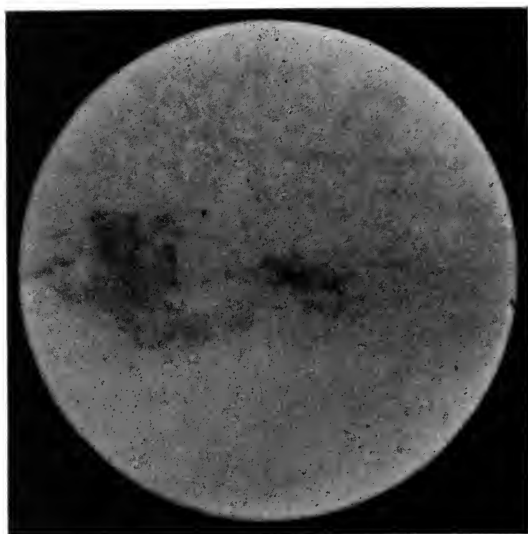


FIG. 1.—Gland smear, showing bacilli from lymph node of monkey suffering from scarlet fever.

CASE 2. On May 26, 1911, at the St. Paul's Hospital, I examined a boy of about six years of age who had been suffering from scarlet fever for a period of about six days. The case was typical and the lymph nodes all over the body much enlarged.

Under strict antiseptic precautions a needle was inserted into an enlarged inguinal node, and a few drops of lymph were drawn off and mixed with a small quantity of sterilized water. With this I inoculated various media, with the result that within a few hours' time a luxuriant white growth appeared, covering the whole surface of the medium, which upon examination proved to be a pure growth of the same bacillus.

CASE 3. A boy ten years of age, suffering from scarlet fever (at the Alexandra Hospital) for a period of five days. This was also a typical case, all the nodes being enlarged. Lymph was

obtained from an enlarged axillary gland and inoculated on various media, where and when a pure culture of the same bacilli developed rapidly.

CASE 4. A girl six years of age, suffering from scarlet fever at the St. Paul's Hospital. On the fifteenth day of the disease lymph was extracted from a large anterior cervical node. After being inoculated on various media a pure culture of the same bacilli was again obtained.

CASE 5. A girl four years of age, suffering from scarlet fever at the Alexandra Hospital for a period of five days. The same process being adopted, a pure culture of the same bacilli was readily obtained.

CASE 6. This was a rapidly fatal case of malignant scarlet fever, where the rash was by no means typical. Cultures taken from the different nodes and inoculated on various media soon showed a vigorous growth of streptococci, and only a few of the bacilli were present.

CASE 7. This was a case of mild scarlet fever in an adult. Lymph from an inguinal node was obtained and blood serum inoculated. The same bacilli were obtained.

It will be noticed that from 5 cases a pure culture was obtained, two from inguinal nodes, one from axillary nodes, and two from anterior cervical nodes.

The first and sixth were postmortem cases, the former being of a severe type, the child dying from myocarditis, yet the bacilli were numerous; whilst the latter was one of great virulence, and, in consequence, the streptococci predominated.

Having obtained the bacillus, which I regard as the specific organism of scarlet fever, I decided to inject a broth culture into a monkey, with the hope that the animal would develop scarlet fever. In this I was not disappointed.

MONKEY NO. 1. At the time of inoculation none of the lymph nodes were palpable. Within forty-three hours, however, both axillæ presented enlarged nodes. The glandular system being generally involved, the monkey was also irritable, very thirsty and rapidly losing weight. On the morning of the fourth day the monkey was very weak and ill, no appetite and still thirsty, with coated tongue.

In the forenoon of the fifth day the animal was still very ill, with a low, weak cry, hoarse, wrinkled face, tongue coated with white fur, throat congested, and presented generally a distressed

appearance. On the same day a red rash was apparent, the lymph nodes also being very much enlarged.

In the afternoon of the same day the monkey was still very ill and weak, the rash persisting, whilst the tongue was characteristic of scarlet fever; the fur had disappeared from the anterior part of the tongue and left the papillæ exposed and prominent; in fact, a typical strawberry tongue was to be seen. At about 7:30 P.M. the monkey suddenly died.

The postmortem showed the monkey to be thin and emaciated. The lymph nodes in the different regions of the body enlarged, kidneys enlarged and congested, and the tongue presented the same strawberry appearance which had developed during life.

I obtained the lymph from cervical, inguinal, axillary and mesenteric glands of the monkey. Tubes of plain agar and broth were inoculated. The following day the same bacillus was recovered.

MONKEY NO. 2. On May 5, 1911, a healthy Java monkey was inoculated with a broth culture, containing the active growing bacilli. The broth was injected into the side of the neck so that the bacilli could be readily taken up by the cervical nodes. At the same time a rabbit was also subjected to similar treatment. On the evening of the following day the monkey was very quiet and did not appear to be well. The lymph nodes were enlarged in both axillæ and inguinal regions.

On the seventh day of May the throat was congested and the lymph nodes had increased in size.

On May 9th A.M. the throat was engorged and dry. Lymph nodes were all enlarged, isolated and quite movable. The tongue was coated with white fur, and red rash on the body. The tongue was also typical of scarlet fever. On the ninth day active desquamation was going on freely and continued for a period of three weeks.

Upon the same day an inguinal node was removed, from which the same bacillus was recovered. On the fifteenth day the same results were obtained from the axillary nodes.

MONKEY NO. 3. On May 12th a healthy young Java monkey, its normal temperature being $103\frac{4}{5}^{\circ}\text{F.}$, was inoculated with the broth culture of the bacillus. This culture was injected under strict antiseptic precautions into the right side of the neck.

On the following day the temperature was $104\frac{3}{5}^{\circ}\text{F.}$ The lymph nodes were distinctly enlarged in both axillæ and inguinal

regions. On the afternoon of May 13th, the monkey was quiet and weak, no appetite, but very thirsty.

On May 14th there was a general enlargement of the lymphatic nodes of the body. A red rash appeared, the throat was congested and the tongue typical of scarlet fever.

On the 15th the same conditions prevailed, but the rash had spread.

On the 17th the rash covered the arms, shoulders and lower abdomen. The throat was congested, the tongue presented exposed and prominent papillæ on the anterior third and was covered with a white fur in the posterior two-thirds. All the lymph nodes were much enlarged and the monkey was rapidly losing weight.

On the 18th I obtained lymph from an enlarged inguinal node, and in this case also the same bacilli were recovered.

I may add further that desquamation also took place in this case.

MONKEY No. 4. A healthy young *Macacurehesus* monkey was inoculated, in the right side of the neck, on the evening of May 29th.

On the following day there was a general enlargement of the lymph nodes, more pronounced, however, in the left axilla and right inguinal regions.

On June 1st the throat was congested and papillæ of tongue prominent. Upon the evening of the same day a red rash was apparent on the front of the neck, arms and shoulders. The monkey was thirsty, tongue in same condition, lymph nodes much enlarged. On the third day the rash spread extensively. On the evening of the fifth day lymph from one of the glands was extracted, from which the same bacilli were again recovered.

I may add that upon inoculation of the same bacillus into a fifth monkey and two rabbits the same disease has been readily reproduced and the identical bacillus recovered.

I have also found the bacillus in smears taken from the gland.

It is well also to point out that in all my experiments Koch's Law has been carried out to the fullest extent.

Both the monkeys and rabbits readily developed the disease. The monkeys used were the *Macacurehesus*, Java and Ringtail. The Rhesus and Java monkeys were much more susceptible to the scarlatina poison than the long Ringtail variety.

The shortest incubation period was two days and the longest five days.

The incubation period in the rabbits was three days. The lymphatic nodes, as a rule, were palpable in thirty-six hours after inoculation.

CONCLUSIONS.

(1) The bacillus has been obtained from the 7 cases of scarlet fever mentioned.

(2) The bacillus will grow on all ordinary media, the growth occurring in three and a half hours. A most rapidly growing bacillus.

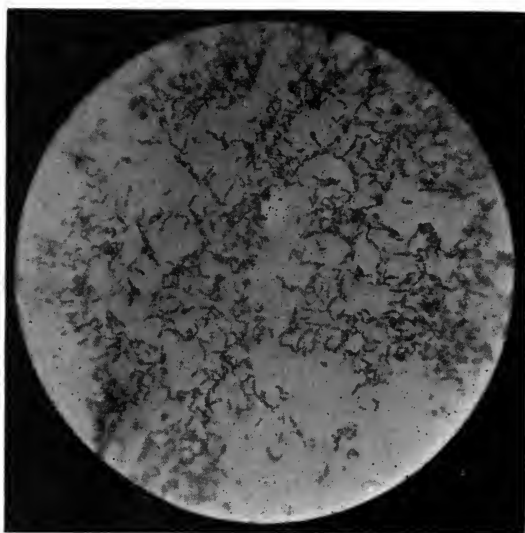


FIG. 2—Bacillus from lymph nodes of monkey suffering from scarlet fever.

(3) The bacilli are to be found in the lymph nodes, where they multiply and form toxins which enter the circulation.

(4) The bacilli have been inoculated into 5 monkeys and 2 rabbits. Typical scarlet fever has developed in all, including the rash, enlarged lymph nodes and desquamation, etc. No suppuration in any one instance took place at the point of inoculation. Streptococci would likely have had this effect.

(5) The same bacilli have been recovered from the lymph nodes in each instance, and further, the typical growth has developed on the different media.

This paper is in the nature of a preliminary report. In the

near future I hope to report a larger number of cases with considerably fuller details.

My thanks are due to Dr. Duncan P. Anderson, of Montreal, for valuable assistance, and also to Drs. Gruner, F. Douglas and A. B. Nichols for their help in the bacteriologic work.

I wish to gratefully acknowledge the courtesy extended to me by the physicians of the Alexandra and St. Paul's Hospitals, Montreal, in giving me free access to their wards, from which I have obtained part of my material.

The following is a description of the growth and of the organism by Dr. Oskar Gruner, pathologist to the Royal Victoria Hospital, Montreal:—

May 30, 1911.

"The cultures show a growth produced by long bacilli with rounded ends, staining variably with Gram, and occasionally showing a beaded structure, but metachromatic granules are not present.

"Some cultures show sluggish oscillatory motility.

"The organism is an active spore former, the spores being endogenous and the same diameter as the organism.

"The culture on broth forms an adherent film, which tends to sink in the medium; the odor is rather offensive. The agar-culture forms a moist, smooth film which develops rapidly; the edges are filamentous and the growth tends to become raised and subsequently wrinkled; pink pigment is ultimately produced.

"On sugar media it is found to be an acid producer with abundant gas formation. (Dextrose, 70 per cent. acid, 30 per cent. gas; lactose, 50 per cent. acid, 25 per cent. gas; saccharose, 60 per cent. acid, 60 per cent. gas; maltose, no acid, 40 per cent. gas; mannite, 70 per cent. acid, 70 per cent. gas.)

"Milk is slowly coagulated with formation of acid.

"Indol is produced in peptone water."

The above paper was read at the Canadian Medical Association's Annual Meeting held at Montreal June 7, 1911.

ADDENDUM.—Since reading the above paper I have succeeded in producing scarlet fever in a monkey and a rabbit by direct contagion from monkeys and rabbits suffering from that disease, and have recovered the identical bacillus from an inguinal node.

THE PREVENTION OF CONTAGIOUS DISEASES IN INFANCY, WITH SPECIAL REFERENCE TO WHOOPING-COUGH AND MEASLES.*

BY FRED P. WEBSTER, M.D.,

Instructor in Pediatrics, Medical School of Maine; Visiting Physician, Children's Hospital; Adjunct Physician, Maine General Hospital; Chairman, Board of Health, Portland, Me.

Although much has been done along many different lines to save infant life, little seems to have been attempted to protect babies from certain communicable diseases. Toward whooping-cough and measles, which, as will be shown, kill more young babies than all other contagious diseases, there is on the part of the medical profession a prevailing attitude of indifference, on the part of the people, a condition of ignorance. There is in statistics abundant evidence of the special seriousness of these affections in early life. By way of example I have combined the mortality figures published in the annual reports of the New York City Board of Health for the nineteen years from 1890 to 1908 inclusive. These, I believe, may be considered average figures and sufficiently trustworthy.

DEATHS FROM CONTAGIOUS DISEASES IN NEW YORK CITY 1890-1908.

	Scarlet Fever.	Diphtheria.	Measles.	Whooping-Cough.
Under 15 years ..	11,000	32,500	12,000	7,000
“ 3 “ ..	4,800	16,000	9,700	6,200
“ 1 year ..	650	3,300	3,300	3,500

If infancy is regarded as ending with the completion of the first dentition, statistics relating to this period must include the third year of life. Upon examination of the above data, the disproportionate mortality in children under three years is most noticeable as compared with the total mortality for each disease; 16,000, or 50 per cent., of the total number of deaths being under three years from diphtheria; 4,800, or 45 per cent., of those from scarlet fever; 9,700, or over 75 per cent. of the total, from measles; and 6,200, or nearly 90 per cent., of all from whooping-cough. These figures for diphtheria are in part too old to be of the greatest value, as only within the last few years has antitoxin treatment been sufficient according to the present standard. On

* Read before Kennebec County Medical Society (Maine), October 13, 1910.

the other hand, it is generally admitted that by serum treatment the mortality in infants from diphtheria has not been reduced proportionately to the reduction in older persons. The above figures for diphtheria show this when divided as below.

DEATHS FROM DIPHTHERIA IN NEW YORK CITY.

	Under 15 Years.	Under 3 Years.
1890-1901	20,000	9,000 = 45 per cent.
1902-1908	12,500	6,900 = 55 " "

Therefore, to put the deaths from diphtheria under three years at 50 per cent. is too low an estimate.

In whooping-cough and measles it must be taken into consideration that deaths are usually due to sequelæ, for example, pneumonia, gastroenteritis and tuberculosis, and that these sequelæ are more common in infancy. Physicians in signing death certificates commonly disregard the prime cause, and give one of these secondary diseases as the sole reason of death; consequently the recorded deaths from measles and whooping-cough are considerably below the actual number. Therefore, since the sequelæ are much more frequent and fatal in very early life, to say that three-quarters of the deaths from measles and nearly nine-tenths of those from whooping-cough occur in infancy is understating the facts.

Upon examination of the same statistics for the first year of life, it appears that 3,500 deaths occurred from whooping-cough, 3,300 from measles, 3,300 from diphtheria and 650 from scarlet fever. This agrees with statistics in general and with the opinion of those who should know, that whooping-cough kills more babies under one year of age than any other contagious disease. If allowances are made for the fallacies stated above, whooping-cough and measles undoubtedly rank above all other highly communicable diseases in the destruction of young infants.

With the recognition of the preponderance of deaths in infancy, if contagious diseases can be prevented during these few years, it is obvious that there will be great saving of life; in fact, that the destructive work of these affections will be very largely stopped. I realize that absolute protection is now impossible, but, since exposure is frequently unnecessary, a great deal of prophylactic work can be done. Certainly the cause is worthy of great effort.

From a prophylactic point of view, I would divide the con-

tagious diseases under consideration into two groups: first, scarlet fever and diphtheria, a group in which much protective work is done; second, measles and whooping-cough, a group in which very little is done in the way of prevention. The reasons for such grouping are apparent, for there is efficient protection against scarlet fever by early and prolonged isolation; against diphtheria by separation and immunization; while in whooping-cough and measles there are no competent protective agents, and, when diagnosis is possible, the advantages of isolation have been largely lost. Then there are misconceptions in regard to contagious affections. Scarlet fever and diphtheria are the more generally feared, and protection is more diligently sought. The misconception is not in the fear of these diseases, however, but in the lack of fear of whooping-cough and measles.

I have attempted to indicate the relation of the contagious diseases to infancy and to show that the greatest preventive efforts are now demanded against measles and whooping-cough. The disproportionately excessive mortality from diphtheria in infancy is conspicuous. In a former paper* I expressed the opinion that this is largely due to delay in diagnosis and to tardy and inadequate treatment. It has already been implied that health boards are active in combating the spread of diphtheria and scarlet fever, and mainly unconcerned about measles and whooping-cough. Although increased protection is necessary against the two former diseases, the most needed and promising prophylactic work is in the checking of measles and whooping-cough, a field almost entirely neglected. The means of prevention are four, and lie in the work of health boards, in the inspection of schools, in the education of the people, and in the individual efforts of physicians.

I. THE WORK OF HEALTH BOARDS.

Health Boards are little concerned with the diseases now under consideration. Grandy† says that further than the exclusion from schools of cases of whooping-cough, he knows of no public measures against its spread. A similar condition, in my opinion, applies to measles. If Health Boards ask for the reporting of these diseases, as they commonly do, why do they not try to effectively check them? To my mind, a Board of Health can

* "Diagnosis and Treatment of Diphtheria in Young Children," *Boston Medical and Surgical Journal*, November 21, 1907.

† Grandy, G. R., "Whooping-Cough from the Point of View of Public Health," *Journal of American Medical Association*, June 26, 1909.

have but two alternatives in attitude toward a disease—either determine its unimportance from a public health point of view and disregard it entirely, or else recognize its seriousness and the value of its prevention and do everything possible to control its spread. The gravity of measles and whooping cough and the importance of checking them is fully demonstrated.

It is only through a knowledge of the distribution of these diseases that health authorities can work; therefore, the first requisite toward action is prompt notification. Here the coöperation of physicians is imperative. If measles and whooping-cough cause the most deaths in infancy there is no question about the advisability of reporting them. On notification, an infected house should be suitably placarded. A card on the door impresses the family and others with the seriousness of the disease, and is a danger signal, which ultimately must do good. It is fair, moreover, that parents should know where these cases are. Welch and Schamberg* advise sending circulars of instruction to all households in the immediate neighborhood of an infected domicile. In the case of whooping-cough quarantine must be modified. Grandy makes the excellent suggestion that, where it is necessary for whooping-cough patients to go onto the street for their airing, they should wear conspicuous ribbons bearing the word "Whooping-cough." The best situation for such a ribbon or badge is the shoulder, because from this point it can be readily seen from in front or behind. During a recent epidemic of whooping-cough, the need of some such measure was impressed upon me, when I tried to protect my own children on the street. Although the contagiousness of whooping-cough diminishes rapidly after the height of the disease is reached, the safest rule, especially with infants, is to avoid such cases as long as there is cough. In measles, the common rule of separation for three weeks is ample.

It is true that reporting and placarding of measles where tried have not yet resulted in any obviously great success, and attempts of health boards to check whooping-cough might go through a similar ineffectual stage. I have no doubt, however, that the advantages of these preventive activities will be proved. Physicians and the public are not yet alive to the necessity of controlling the diseases under discussion. As a member of the Portland Board of Health, it has been demonstrated

* Welch and Schamberg, "Acute Contagious Diseases."

to me that knowledge of the general public, more than any other factor, causes physicians to report diseases. As mentioned above, people are cognizant of the dangers in scarlet fever and diphtheria, and know the value of quarantining them; consequently they are well reported. A large percentage of the cases of typhoid fever and tuberculosis are not reported, yet the value of reporting them to health authorities is becoming common knowledge, and the first notification frequently comes from interested lay people. The dissemination of knowledge of acute poliomyelitis has aroused the public so that this disease will of necessity soon become notifiable and quarantinable everywhere. A similar awakening of the people to the dangers of whooping-cough and measles and the value of controlling them will, I believe, force physicians to report promptly these serious affections, and compel health authorities to fight their spread.

2. THE MEDICAL INSPECTION OF SCHOOLS.

For medical supervision to achieve the best results, there has to be coöperation of the parents, the teachers and the physician. The school physician should act chiefly as an adviser and furnish the parents and the teachers with what he considers the best prophylactic rules. He should urge compliance with these rules on the ground that their sole purpose is the welfare of the children. Much prophylactic work is possible in schools, since they are to a large degree responsible for the spread of acute contagions. Susceptible brothers and sisters of patients ill with whooping-cough or measles are often allowed to continue at school during the most contagious catarrhal stage.

About a year ago I undertook the medical supervision of a kindergarten. What contagious diseases the attending children had had, what contagious diseases their brothers and sisters had had, and what schools the latter attended were ascertained and recorded. In a letter every mother was instructed to notify the school when any case of contagious disease occurred in her household, or whenever one of her children was known to have been exposed to contagion. It was strongly urged upon parents that a child, who was not perfectly well, should not be sent to school; that, aside from possible danger to other scholars, at the kindergarten age, school is not the place for a child physically below par. Emphatic prohibition was made against "colds." No child with a "cold" was to be sent to school until the child was dis-

tinctly convalescent. This would, to some extent, prevent the spread of so-called simple respiratory catarrhs, but most importantly would prevent a child from attending school during the catarrhal stage of measles or whooping-cough.

I found that, although the parents were of more than ordinary intelligence, they could not be depended upon for assistance. It was difficult to learn of known exposures. Measles started in the school, and, although closing the kindergarten for a week limited the number of cases to 2 or 3, some parents felt that their children's loss of school time, for which they were paying, was unwarranted. It became evident to me that parents are not yet educated to an appreciation of the seriousness of these diseases and consequently appear to lack regard for the children of others. In spite of disappointment, I felt that my efforts were of some avail, and I believe that with persistence in this direction parents will coöperate better, and that these prophylactic ideas will not seem so trivial or of doubtful value to them.

A school physician is especially called upon to act when an epidemic threatens the school; for instance, when a scholar develops a contagious affection. In the first place, the parents of scholars must be notified of the possibility of their children's contracting the disease. An early warning will make it possible to protect babies by separation. The temporary closing of school may be of great advantage; for example, with measles, which is contagious so early, if, a week after the appearance of the first case, the kindergarten is closed for one week, the spread may be stopped, since those who take the disease from the original case will be taken ill during the second week. At times it will be necessary only to exclude temporarily those who have not had the contagion concerned.

All this discussion of preventive work in the kindergarten would be of less importance to the subject of the paper if it were not for the fact that very frequently the kindergarten child has an infant brother or sister at home. Of course, for the best results there must be medical inspection and counsel in all the schools, yet, in my judgment, the best prophylactic work along this line is to be done in the kindergarten.

3. EDUCATION OF THE PEOPLE.

During the last few years there has been a remarkable movement, carried on by physicians largely through magazines and

newspapers, to educate the masses in medical truths. An incalculable amount of hygienic instruction has been given by individual physicians and probably the popular education in medical matters has been as extensive in the care of children as in any other direction. The sending of circulars of instruction by Health Boards, as previously mentioned, has distinct educational, as well as immediate prophylactic value. This educational movement has only begun. The more it extends the more will be demanded of physicians and Health Boards.

The most harmful popular misconception of measles and whooping-cough is the regarding of them as trivial. The ignorance of parents is not infrequently shown in the intentional exposure of their children. Many of them believe that a child would best have these diseases when young, as they have an idea that these affections are more serious in the fully grown. Occasionally a physician is asked whether it is best to expose a child to some communicable infection when it is prevalent in a mild form. Many doctors believe that this is good policy, but I disagree with them, since it continues the spread, and babies are liable to be attacked. These diseases should always be checked. There is the objection that, if these infections are stamped out for a generation natural immunity will be lessened, but it is the part of wisdom to control their spread as completely as possible, and to trust in the increased capacity of the physicians who will succeed us. Parents should be informed that, in contagious diseases at the present time, the chief dangers to babies lie in whooping-cough and measles. They should be told that, while a young child will probably go through one of these sicknesses safely, there is the possibility of a fatal issue, or that the child may be left handicapped by its sequels. They should be undeceived as to the supposed greater severity of these diseases in adults, confirming which there is no good evidence.

Since whooping-cough and measles begin with respiratory catarrh, babies must be kept away from children with "colds." These "colds" themselves are contagious, and often in infants are the source of great harm. I feel strongly on this point, and believe that during epidemics of these infections the avoiding of children with "colds" is the most effective method of prevention. A mother who closely adheres to this precautionary measure will hurt the feelings of some friends, but the welfare of her own baby is more important than the ignorant sensitiveness of other

persons, and she may have the consolation of knowing that what is considered fussy or extravagant to-day may be the ordinary common sense of to-morrow.

There is need of legislation to prevent whooping-cough patients' going where people gather, as, for example, on cars or into stores. Such legislation would stop the perilous practice of allowing infants to compete in baby shows. Last winter among the names of forty babies in such a show at a theatre, I noticed that of a child whom I was treating at the time for whooping-cough. Certainly too much cannot be said against such rank exposure of infants. The taking of babies where people congregate, for example, on cars, to the theatre, and into department stores, is attended by risk. The exhibiting of babies to children and the taking of them calling are needless and dangerous practices. During early infancy a child should be kept in its carriage or basket within the family premises when out of doors. There is no advantage in wheeling a little baby about the streets, and they are looked after with less trouble if this unnecessary habit is not begun during the early months of life. The kissing of babies is a dangerous habit that will not be long tolerated.

4. THE INDIVIDUAL EFFORTS OF THE PHYSICIAN.

The personal rôle of the physician in preventing contagious disease is a most important and responsible one. Only through his coöperation is efficient Board of Health work possible. He should be prompt in reporting diseases and he should also be as accurate as possible in recording causes of death, since mortality statistics are of value in planning and measuring preventive work. Mainly through the efforts of the physician the masses must be educated. Most physicians are necessarily restricted in their educational endeavors to that of teaching parents, but this, particularly the instruction of mothers, is the foundation of successful pediatric practice. In order to show a solicitous watchfulness over infants, a physician must have a true regard for them, and must consider no detail in their salutary management so small as to be negligible.

In dealing with contagious disease proper isolation must be carried out as early as possible. This requires an early diagnosis, but suspicion of a communicable disease is sufficient reason for separating a patient from babies. Many doctors believe that, because of early contagiousness, isolation of measles patients is

futile, but in the catarrhal stage, with the appearance of Koplik's spots, or even later, separation will in the long run protect others. The greatest gain is made, however, when patients with whooping-cough and measles can be placed under surveillance in the incubation stage, *i.e.*, when an unprotected child is known to have been exposed. I am not ready to say that all known exposures should be reported to health authorities for their action, although this might be an advantageous plan. In his private practice the physician may, however, at times protect babies by separating them from those known to have been exposed to infection. Fifteen days is considered a sufficient time to keep under observation a child exposed to whooping-cough or measles, provided that, at the end of this period, there have been no catarrhal or other early symptoms.

The avoiding of children with "colds" and the surveillance during the incubation stage should prove the most valuable measures of preventing whooping-cough and measles.

Lastly, physicians should be very careful not to spread diseases themselves. Kerley* pertinently mentions that "as a rule physicians in attendance upon contagious diseases are grossly negligent as to the use of proper precautions against themselves becoming mediums of infection." Most doctors believe that only in scarlet fever and diphtheria such precautions are necessary. The possibility of a third person's carrying measles and whooping-cough does not appear to be great, but there is no certainty of not doing so. In fact, I know of cases of measles and whooping-cough in which seemingly to a certainty the contagion was communicated by the physician. Probably very few of us would feel comfortable if we knew that a doctor had just come from attendance upon one of these diseases to see a baby of ours. The situation suggests a comparison between the medical men of to-day and the surgical men of a quarter of a century ago. Then operations were frequently successful; but improved technique, particularly asepsis, has now given far greater security. Is it not probable that much is still to be gained by better medical technique, particularly in an approach toward medical cleanliness? Surely the saving of infant lives is worthy of our best efforts, and physicians should be willing to devote the time, thought and care which are necessary to accomplish the result.

* Kerley, "The Treatment of the Diseases of Children."

CONTAGIOUS DISEASES.—MODERN TREATMENT.

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In this paper the discussion will be limited to the three infections—diphtheria, scarlet fever and measles—with special reference to their treatment and the points of interest in bacteriology, symptoms and diagnosis, to which special attention is directed at the Boston City Hospital for Contagious Diseases.

We shall begin with diphtheria. Although its history can be traced back to about the first century A.D., it was not called by its present name until Bretonneau, in 1821, published a paper upon the subject. Nothing was known of the specific cause of this disease until, in 1883, Klebs demonstrated the bacillus in the false membrane of diphtheria, and in 1884 Loeffler isolated and cultivated it. Speaking generally, the Klebs-Loeffler bacillus is a short, straight or slightly curved rod, with a diameter of 0.5 to 0.8 μ and from 2 to 3 μ in length. It is described as "aerobic, non-motile, non-liquefying and grows characteristically on Loeffler's blood serum, which should be neutral or slightly alkaline." When stained with Loeffler's methylene blue they present a beaded, striated, granular appearance arranged side by side and at times end to end, the growth being most characteristic from a culture. The majority of specimens seen with the average microscope, unless carefully analyzed, simply present the appearance of many imperfectly stained rods, with no stain between the granules, but with the characteristic arrangement of the bacilli. On closer inspection a great number of different varieties can be made out, many being involution forms. The size and general appearance of the bacilli are often influenced by the length of their incubation.

Wesbrook has classified these varieties into the granular, barred, and solid types, and credits the granular forms with being most often associated with clinical diphtheria. The barred and solid forms are found most frequently in the noses and throats of healthy persons. The xerosis bacillus, which causes a conjunctivitis, is of the barred or striated type, and produces no clinical symptoms of diphtheria.

The pseudodiphtheria or Hofman bacillus grows better upon agar than the Klebs-Loeffler, is shorter and thicker and does *not*

show granules when Neisser's stain is used. It is non-virulent for guinea pigs and does not produce acid in dextrose broth, while the *granular* or virulent forms do. Briefly, then, the cultural characteristics of the Klebs-Loeffler bacillus are as follows:—

It grows best upon Loeffler's blood serum; grows also upon gelatin and agar, but does not liquify the former and there is no growth upon potato. In milk of feeble acid reaction the growth is abundant, but the lactose is not fermented and no curdling of the milk is produced. While mentioning the cultural characteristics for the sake of completeness very little requisition is made to them for routine diagnostic purposes, which practically depend upon the microscope and clinical symptoms.

A good working classification of bacilli diphtheriæ based upon the Wesbrook types, which holds good *now* for public institutions, and which has been practiced successfully since 1902 or 1903 by the Boston Board of Health, was summarized by H. W. Hill in the *Americal Journal of Public Hygiene* of May, 1907.

(a) The types are based upon microscopic examination of smears, stained with Loeffler's methylene blue made from cultures grown upon Loeffler's serum and incubated twelve to twenty-four hours at 37°C.

Seven primary divisions, based on *size* and *shape*, are recognized. Each primary division is further subdivided into three, based on staining reactions to Loeffler's methylene blue. The plain letters A to G are used for the first subdivision in the respective primary divisions, A₁ to G₁ for the second, and A₂ to G₂ for the third, making 21 individual types in all.

(b) The system of primary division is based on size.

(c) The system of secondary division is based on the reaction between certain portions of the protoplasm with the stain used. Thus the plain letter divisions are all stained uniformly but for the presence of certain more densely-stained round or oval granules, approximating the diameter of the cell in which they lie.

(d) The first subdivision, designated A₁ to G₁, shows alternate bars of light and dark stain placed transversely across the length of the cell, while the second subdivision (A₂ to G₂) are stained uniformly throughout, except that the last four have a single colorless band across the middle.

(e) The present status of opinion and practice amongst American bacteriologists classes A, C and D as "significant"

types, A_1 , A_2 , B_1 , B_2 , C_1 , C_2 and E as "doubtful," and D_1 and D_2 , E_1 , E_2 , F, $F_{1/1}$, F_2 , G, $G_{1/1}$ and G_2 as negligible types, in routine cultural diagnostic work. Therefore:—

(1) Diphtheria bacilli reported *present* means that types A, C or D were found, irrespective of presence or absence of associated types.

(2) Diphtheria bacilli reported *absent* means absence of A, C or D, and of A_1 , A_2 , B_1 , B_2 , C_1 , C_2 and E, but irrespective of presence or absence of remaining types.

(3) *Atypical* organisms reported *present*, accompanied by request for another culture (*i.e.*, a "doubtful" diagnosis) means that A_1 , A_2 , B_1 , B_2 , C_1 , C_2 or E were found, but not A, C or D, and irrespective of the presence or absence of the remaining types.

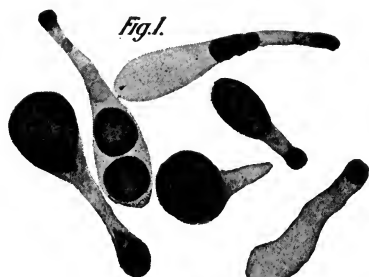


FIG. 1.—Type A.
FIG. 2.—Type A_1 .
FIG. 3.—Type A_2 .

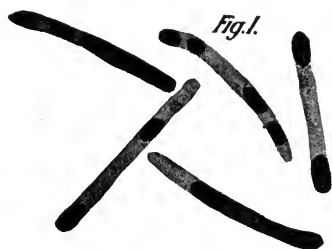


FIG. 1.—Type B.
FIG. 2.—Type B_1 .
FIG. 3.—Type B_2 .

As an addition to the above it is to be borne in mind, also, that both the size and arrangement of the bacilli are helpful features in making a diagnosis.

Although pharyngeal diphtheria is the most common, in some localities the laryngeal type is much more prevalent than in others, notably some of the coast cities. Among these Boston and Baltimore are conspicuous. In the nine years between 1895 and 1904 there were at the South Department in Boston 1,553 cases which required intubation, or an average of about 15 a month, which certainly presupposes a large number of laryngeal cases.

Concerning complications, it is to be remembered that not

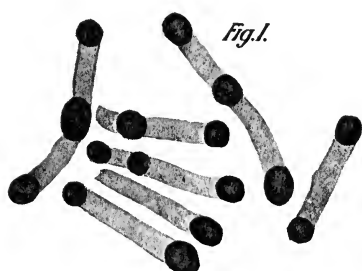


Fig.1.

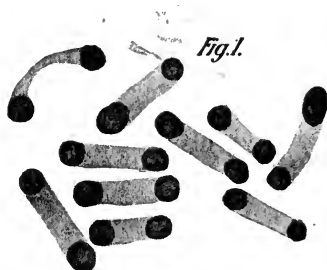


Fig.1.



Fig.2.



Fig.2.



Fig.3.



Fig.3.

FIG. 1.—Type C.
FIG. 2.—Type C₁.
FIG. 3.—Type C₂.

FIG. 1.—Type D.
FIG. 2.—Type D₁.
FIG. 3.—Type D₂.



every rash which occurs is due to antitoxin. An erythematous eruption of grave import covering various parts of the body, and a purpura hemorrhagica which, occurring only in very serious cases, is usually a forerunner of death. An urticaria also appears at times.

At the South Department cervical adenitis without suppuration seemed to be practically constant, but nephritis was observed only in the severe cases, although transient albuminuria was not infrequent.

In laryngeal cases bronchopneumonia was prone to develop, and where a fatal issue followed intubation this was responsible for about 20 per cent. of the deaths.

Dr. McCollom says that paralysis occurs in about 40 per cent.

of all cases. I think this does not apply to the Contagious Hospital in Boston, as the percentage is unquestionably much lower there. Of the varieties seen the palatal type, or "plum pudding" form, so called because of the difficulty these patients experience in enunciating this combination of letters, is probably the most frequent. When looked for the patellar reflexes are found to be absent in a large proportion of cases.

The upper and lower limbs are rather infrequently affected, and the respiratory muscles were paralyzed in a small percentage of fatal cases.

Among the most interesting as well as appalling complications are those pertaining to the heart, as in the case of a little girl whom I saw, who, apparently going along nicely in about the third week, was suddenly seized with an attack of vomiting and epigastric pain. The pulse became much slower than formerly, was quite irregular and was accompanied by cyanosis and cold extremities. As is usual in these cases, the mind remained perfectly clear, but the child died in a syncopal attack within twenty-four hours. All will recognize in this well-known train of symptoms the pneumogastric paralysis, in which many of the nerve fibers have undergone a fatty degeneration.

Another form of heart failure which is even more surprising, because of almost no prodromal symptoms, is that in which both the heart muscles and nerves have undergone degenerative changes. An illustrative case was a little girl convalescing in the third or fourth week, with absolutely no discomfort whatever. The only thing noticed was a slightly irregular pulse. I had asked her in passing her bed, where she was sitting up, if she felt all right, which question was answered in the affirmative. I had not left the ward more than a minute when she fell over in a state of collapse. The usual stimulants were given, but were unavailing. These conditions but clearly point to the wisdom of frequent examinations of the heart and pulse.

Most of the diagnostic points in regard to the specific organisms have already been considered.

On account of the great peritonsillar swelling and redness observed in some cases of beginning diphtheria a diagnosis of quinsy is often made before the appearance of the membrane. It is to be remembered that, early in the disease, the membrane may be removed without bleeding, as in the case of a streptococcic membrane.

In taking cultures the swab should be passed over the edges of the membrane and not over its center.

We will pass over the general treatment and take up at once the subject of serum therapy. Before the use of antitoxin was begun in the South Department the death rate there was 43.2 per cent. Since its use the mortality has been lowered to 9.5 per cent. Among 190 cases contracted by nurses and physicians in the institution there have been no deaths, due probably to the prompt administration of antitoxin.

The site for injection is the back near the angle of the scapula, and the syringe used is glass with about six inches of rubber tubing (to allow for struggles of patient) connecting the needle. It is considered most desirable to inject not more than 4,000 units in any one site, although, experimentally, 30,000 units have been injected into one site without removing the needle, with no more resulting inflammation than from a smaller amount.

All patients on entering the hospital, whether suffering from measles, scarlet fever or diphtheria, are given an immunizing dose of 2,000 units. Immunization lasts twenty-one days. Babies a few weeks old are often given only 500 units. Right here it may not be amiss to suggest the possible injurious effect of these *small doses* of serum upon those who, later on, after leaving the institution, may require to be given larger doses. However, the subject of anaphylaxis is not yet worked out, and we seem to be reasonably safe for the present in ignoring a remote and probably a dangerous condition which does not exist for the sake of a positive benefit in their acquired immunity while in the hospital.

The antitoxin in Massachusetts is furnished free by the State and dispensed in bottles containing 4,000 units each of the non-concentrated antitoxin.

Ordinarily severe cases in children and adults received doses of 12,000, 16,000 and 20,000 units three times daily. It is not at all uncommon for severe cases to receive 80,000 units during the day. As it was once stated at the institution, the principal objection, as far as harmful results were concerned, to a dose of 100,000 units was the mechanical inconvenience of the injection of a large amount of fluid. Children of six years suffering from an ordinary form received about 8,000 units three times daily; if they were septic about 16,000 units three or four times daily. The gradual discontinuance of the antitoxin is guided by the appearance of the membrane and tonsils, viz., inflammation, swell-

ing, etc. Their record cases received about 340,000 units during the acute period. The site of injection is covered by cotton and collodion.

Arthralgias and serum rashes are quite common. Of the latter we see erythematous, scarlatiniform, morbilliform and urticarial varieties. Arthralgia, I think, is about as likely to occur after small doses as large.

Those having larger doses are somewhat more apt to have rashes than the patients who receive small ones. If concentrated antitoxin were used rashes would be less frequent. It is the serum, not the antitoxin, which produces the rash.

Indications for intubation are retraction of substernal and supraclavicular spaces, stiffness of abdominal muscles, dilatation and contraction of *alæ nasi* and cyanosis—the latter being seen in extreme cases. In the operating room a table is always kept in readiness for this emergency. On it is a small head rest, mouth gag and instrument for prying open teeth, blanket for wrapping up patient, etc. The intubation and tracheotomy sets are spread out in readiness upon a couple of treatment tables.

The recumbent position is used exclusively for the operation. With the patient wrapped thoroughly in the blanket, with the back of the head resting on the hard pillow and very slightly thrown back, an assistant holds the head and the mouth gag. The index finger of the left hand is inserted along the tongue until tip of epiglottis is reached. With the finger slightly to left side (physician's left) of epiglottis it is brought forward and held there while tube is gently inserted with right hand, using the left index finger as a guide. Finger holds tube in place while inserting the instrument and is withdrawn. If operation is successful the child usually coughs, but not always, and the characteristic noise is made, caused by a deep inspiration taken through a larynx and trachea filled with membrane and mucus. If all is right the mouth gag and left index finger for holding the tube in place are again inserted, while string attached to tube is cut and pulled out. Sometimes when the tube is coughed up the offending membrane comes with it and a reinsertion is unnecessary. If proper relief is not obtained reintubation should be performed at once. It is desirable to remove either intubation or tracheotomy tubes for a trial in three or four days.

Extubation is usually more difficult than intubation.

The patient is prepared in the same way. The left index

finger pulls forward the epiglottis and the extractor is guided down over the posterior surface of the finger into the tube or alongside of the finger, depending upon the position of the index finger. If the tube is partly withdrawn, but the extractor slips out, the tube may be assisted the remainder of the way out by means of the index finger. Great care must be used to avoid pushing the tube down into the trachea.

If intubation does not relieve conditions, or in some cases where the tube has been coughed up many times, tracheotomy is indicated. A brief description of this operation follows:—

High tracheotomy, viz., the one performed above the isthmus of the thyroid gland, is decidedly the operation of choice, because the intracellular tissue is much less rich in veins and it is not nearly so difficult. Occasionally in children it is necessary to perform the low operation when the isthmus is especially high. As a rule, the latter operation is reserved for removal of foreign bodies from the trachea when located near the lung.

In performing the high operation a pad is placed under the neck or the head is slightly suspended over the edge of the table. An assistant firmly holds the head so that the anterior part of the trachea is absolutely in the median line. An incision of an inch or an inch and a half is made downward from the cricoid cartilage which will divide the skin and superficial fascia. The edges are immediately retracted, preferably by a Bose's retractor, which pulls *evenly* on both edges of the wound, helps to control hemorrhage and dispenses with one or two of the assistants. Next the sternohyoid muscles are divided in the median line and retracted in the same manner. Our next step is to shove the isthmus, usually covering the second, third or fourth rings, downward, which is accomplished by first making a slight transverse incision over the cricoid cartilage and then with the handle of the knife pushing or dissecting it downward, thereby exposing the trachea to view.

Before opening the trachea it is well first to stop all hemorrhage, then steady it with two sharp hooks bent outward, one held in the left hand of the operator, the other by an assistant. Two or three rings are then incised from below upward, and if more space is needed the cricoid cartilage may be cut. A three-pronged dilator should be inserted into the tracheal opening and any membrane removed from the tube with forceps. The tracheotomy tube may be inserted while the dilator is still in place.

The technique of the low operation is practically the same, ex-

cept that much greater care is required on account of the richness of the veins. The isthmus must be pushed upward instead of downward.

At the Philadelphia Hospital for Contagious Diseases the chief resident physician, Dr. Samuel S. Woody, has gotten splendid results in septic cases of diphtheria from the use of the so-called Murphy or continuous irrigation. The apparatus consists of a fountain syringe filled with normal salt solution, suspended at head of bed, about six inches higher than rectum. This is connected with a glass bottle immediately below it, which serves as an indicator of how fast the fluid is dropping. About forty drops to the minute is considered desirable. The bottle below is connected with a rubber hose, which, passing over a hot-water bag lying on a table, keeps the liquid sufficiently warm. The tube then passes on into the child's rectum into which it is inserted about one inch. The children so treated seemed to experience no annoyance.

All patients admitted to the hospital, whether because of diphtheria, scarlet fever or measles, have cultures taken from both throats and noses. First, cultures on admission are examined by the physician in charge. If it is negative, cultures are taken daily until a positive one is obtained, except in laryngeal cases, where it is recognized that the bacilli may remain entirely within the larynx.

About seven days after disappearance of membrane, unless, because of some complication, it is desirable to detain the patient longer, dismissal cultures from nose and throat (and ears where there is discharge) are started. Three successive negative cultures are required before the patient is discharged and the physician in charge always examines the last one. Careful attention to nasal hygiene facilitates the early disappearance of the bacilli.

The greatest susceptibility to *scarlet fever* is found to be between the ages of three and seven, but nursing infants are especially susceptible. It is suggested that the apparently acquired immunity after fifteen years of age is due to unrecognized attacks in early life. Dr. McCollom thinks the incubation period is from four to twenty days.

The specific organism has not been discovered. It has been suggested by many observers that the streptococcus pyogenes, or one morphologically similar, is the cause, but this has not been proven.

Mallory thinks that the disease is probably caused by a protozoan. These bodies of two varieties, the granular and radiate, described by him as being from 2 to 7 μ in diameter, are found in the skin of scarlet fever patients. The shapes are suggestive of fixation while in ameboid movement. Segmentation of these bodies takes place, and these segments become entirely separated from the central body.

I had the opportunity of observing about 170 cases of scarlet fever at one time in the South Department, Boston. Probably the pronounced and constant appearance of the strawberry tongue impressed me as much as any diagnostic point. After the eruption has left and before desquamation has set in, it is about the only reliable feature. After scraping the surface of the tongue with the depressor, which also brings out the glazed appearance, the papillæ may be seen to stand out in some cases like miniature mushrooms. This is especially noticeable in young children.

A constant symptom is the reddened area on arch of soft palate extending over both tonsils, but a less frequent one is the occurrence of a punctate rash on roof of mouth. This is to be distinguished from the more or less punctate appearance on the palate, which is normally present. The punctæ from scarlet fever are a decidedly bright red. It is important to look for desquamation beneath fingernails at junction of pulp with nail.

The statistics of the institution show that cervical adenitis appeared to be present in about 50 per cent. of the cases, albuminuria in about 70 per cent., otitis media in 18 per cent., chronic nephritis in 20 per cent. of the South Department cases. Endocarditis is common, especially evidenced by a mitral systolic murmur.

About 40 per cent. of the reported cases of scarlet fever in Boston are treated in the Contagious Hospital. Patients with simple, uncomplicated cases are kept in bed for three weeks on a milk diet. This is very important as mitigating the occurrence of nephritis. Uncomplicated cases are discharged in from six to seven weeks. The same culture routine as to three negative reports is gone through as on diphtheria side before patients are dismissed. This includes examining all discharges from the ears.

At the Philadelphia Contagious Hospital cultures are made from all discharges of the nose and ears. An appropriate serum of the dead bacilli is made and injected into the special case. All local treatments cease on the commencement of the administration

of the serum, and they claim very good results in hastening the disappearance of the discharge.

Measles is the most widely spread infectious disease and very few people escape. It is almost always transmitted by direct contact, but in rare instances may be spread by a third party or by fomites. It is very unlikely that any one moving into an apartment in which there had been measles would become infected (Dr. McCollom).

Nearly every one is susceptible, but nursing infants under five months enjoy an almost perfect immunity. Second attacks are rare. Symptoms appear in from nine to eleven days after infection and the rash four days later. In our Cincinnati epidemic last winter the late appearance of the rash was noticeable, as in several cases of my own the rash did not appear until the fifth or sixth day after the appearance of symptoms.

The præruptive stage is responsible for the great spread of epidemics, as unrecognized cases are continually mingling with others. In a hospital it is especially necessary to guard against this condition so as to avoid cross infections. The Koplik spots are relied upon by the South Department physicians to avert this catastrophe, and when found are treated with as much respect as a characteristic, fully-developed measles rash. The internes are instructed to make frequent examinations of the mouths of all patients for the first nine or ten days after their admission to the diphtheria building. This sign is not neglected among scarlet fever patients either, as the two diseases are not infrequently associated. A patient with these signs is promptly isolated and many cases of infection undoubtedly prevented.

As is well known, these spots may be detected as early as four days before the rash appears, and the most characteristic location is on the inner sides of the cheeks and next to this are the lips. They are not seen on the soft palate. Strong daylight is almost essential for detecting them. These bluish-white specks on a blotchy, bright-red patch never coalesce, but remain punctate. After the eruption is thoroughly out only the bluish-white specks are to be seen on a generally reddened mucous membrane. They are seen often in the nose and less frequently on the conjunctiva.

If examined, most eardrums would be found to be reddened in measles patients. Suppuration occurs frequently and often a discharge is the first intimation of trouble. Frequent inspections are advisable.

Albuminuria is common, but nephritis is rare.

Of the serious complications bronchopneumonia occurs often and is the most to be dreaded. Lobar pneumonia and heart complications are unusual.

Hospital cases of measles get along more poorly than any of the other infections.

The South Department has been a model institution for sixteen or seventeen years. Dr. John H. McCollom, its chief resident physician for many years, is an authority on contagions, and his work at the institution is now very ably carried on by his successor, Dr. E. H. Place. The diphtheria and scarlet fever buildings, although built about sixteen years ago, at present leave very little to be desired for a contagious hospital. Each floor is divided into four separate units with open-air space between, with an open-air staircase the only means of reaching the second floor. Each building, therefore, has eight absolutely separate units.

The only thing open to criticism is that the nurses in the wards are not gowned. They live in separate nurses' homes, but eat in a general dining room. The lack of gowns for the nurses is not due, I believe, as much to an acceptance of Dr. Alva H. Doty's views as to adherence to old customs and possibly somewhat influenced by a seemingly necessary, but, in my opinion, ill-advised economy. All physicians are carefully gowned, however. Splendid results are achieved in spite of the above slight handicap.

Most patients are brought to the hospital by means of ambulances, for which purpose from three to five are constantly in use. Inside of vehicles is daily washed with a solution of corrosive sublimate.

When relatives are sent for because of serious condition of patients, the message is transmitted through the Western Union, so that an undisputed record will be kept. Only the relatives of those on the dangerous list are permitted to see the patients, and the dangerous list consists of those with serious complications; also all intubation or tracheotomy cases.

The laundry of nurses, physicians and patients is sterilized for forty minutes.

When patients are discharged they are first washed with soap and water in the wards and then taken to the discharging bath outside the ward, which consists of about 1-40,000 solution, viz., 1 ounce of $\frac{1}{25}$ solution of corrosive sublimate in 35 gallons of water.

The disinfection of rooms consists in covering all cracks, ventilators, etc., with gummed rolls of adhesive paper and using for each 1,000 cubic feet: formaldehyde, 1 liter; potassium permanganate, 13 ounces. Afterwards walls and ceilings are washed with a 1-100 or 1-500 corrosive sublimate solution.

All refuse from the institution is burned.

It is naturally impossible and unnecessary to go into all the details of an institution of this description, but I hope that enough has been said to carry conviction as to its efficiency and the splendid work done there.

Before closing, it will, I think, be appropriate to refer briefly to the well known views of Dr. Alva H. Doty, Health Officer of the Port of New York.

He disbelieves almost entirely in the fomites theory, and feels that the spread of diphtheria, measles and scarlet fever in schools is due to mild and unrecognized cases of those diseases. These patients may have Klebs-Loeffler bacilli in their noses and throats without clinical signs; sore throats and desquamation which are really manifestations of scarlet fever, and colds which are really a part of measles. These are the causes which make epidemics rather than that these patients have brothers and sisters at home who are suffering with these diseases.

The author holds that the acceptance of the fomites theory renders spread of infection probable, as the authorities will likely become negligent in hunting for new cases. He believes in the disinfection of clothing, however, as they will retain the germs for a short period, but will very rarely carry the contagion to others.

If in common with the author we reject the fomites theory we might become more alert on the scent of new cases, but would we not fall into the opposite error, viz., of neglecting to take the proper precautions in the homes and among the other members of the family? Such a doctrine spread broadcast among the public would be exceedingly unwholesome, as they are already too "broad minded" when it comes to exposing other people's children.

We should be more alert in examining the noses, throats and ears of slightly ailing or apparently well children, as I believe they are largely responsible for the spread of contagions, but with our present knowledge we are very far from being in a position to neglect the other side of the question.

THE CASUISTRY OF CHYLOUS ASCITES AND CHYLOCELE IN SUCKLINGS AND VERY YOUNG INFANTS, WITH REPORT OF A CASE.*

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Reports of cases of chylous effusions into the serous cavities have greatly increased since Dr. Samuel Busey's first collection of 53 cases in 1889. Dr. Busey's report covers the period from 1699 to 1889. Since this time further collections have been made, notably by Bargebuhr in 1893 and in 1895, by Verdelli in 1894, by Rotmann in 1897, and by Shaw in 1909. A few other collections have been made, but either because of incompleteness or unsatisfactory arrangement with regard to references they are not referred to. Since Shaw's collection quite a number of new cases of chylous ascites have been recorded. These may be easily found in the *Index Medicus* or *Bibliographia Medica*.

A case of chylous ascites and chylocele in an infant fourteen days old, entering my service at the University Hospital, prompted me to look up the occurrence of this condition in sucklings. To this end the above-mentioned collections were gone over carefully, as well as other references, during and since the period covered by these reports. As I have found several cases of chylous effusions in adults during the period covered by the above reporters and evidently overlooked, it is not at all improbable that I, too, have failed to find recorded cases in infants.

In the collected cases frequently no age is given. I have endeavored to ascertain from the original articles or abstracts of them whether these cases were in adults or infants. One or two cases recorded as children in these collections were found to be in adults. In all I have been able to collect 8 cases in infants, which, with my own, makes a total of 9 cases recorded since 1691, when Dr. Morton reported the first case. I have arranged these in two groups. Group I. includes 6 cases during the suckling period. All but one of these are under twelve months old. Group II. includes 3 cases in infants up to the end of infancy, as pediatricians regard that term, the oldest being thirty-two months.

The reports of the 9 cases are given in full. For the sake of brevity I have made some rearrangements and have omitted

* Read at the Twenty-second Annual Meeting of the American Pediatric Society, Washington, D. C., May 3-4, 1910.

many unnecessary repetitions. The reader is particularly directed to the first and very interesting case of Dr. Morton, in the second group, published in 1691. For the excellent translation of this from the Latin I am indebted to Professor Meader, of the Latin department.

Chylocele, chylous effusion into the scrotal sac, was present in 4 of the cases—those of Kaminski, Letulle, Kerr and Cowie. In the latter 2, fluid was withdrawn by paracentesis and could be displaced into the abdomen by pressure. Letulle simply makes the statement that the scrotum was tumefied.

GROUP I. CHYLOUS AND CHYLIFORM ASCITES IN SUCKLINGS.

CASE I. Wilhelms, 1874, in infant ten months old.

Mail-carrier Gierling and his wife, both well and robust, were rejoiced at the birth of a strong girl baby on New Year's night, 1873. When the child was six weeks old it developed whooping-cough and, in spite of all that could be done, the child remained ill for two months. About two months after recovery from the whooping-cough the parents observed that the abdomen of the child was gradually increasing in size. The child took its food well. Finally the abdomen became so distended that it vomited. The doctor in charge of the case gave up all hope of recovery and withdrew. [The case came into Wilhelms' care first of October, 1873.] There were all the signs of ascites in this six-months-old baby. Because of this I was likewise moved to discourage the parents in any hope of its recovery. Operation was necessary. I made a paracentesis abdominis and emptied, to my great astonishment, a white fluid, 16 pints in all (16 Schoppen maas). The fluid had the appearance of milk. Prof. Rindfleisch, of Bonn, declared, after examining some of the fluid, that it was pure "lymph" that had flowed into the abdominal cavity from the thoracic duct. Examination of the abdomen after tapping.—The organs were in normal condition. In the region of the navel a tumor mass the size of a large hen's egg was felt lying attached, immovably, to the vertebral column. My opinion is that the tumor is nothing more than a lymph gland, which is connected by a fistula with the thoracic duct, in consequence of which the lymph is permitted to flow into the abdominal cavity. [During a period of seven months, from October to April, Wilhelms tapped the abdomen ten times.] Shortly before the operation, when the ascites was at its height, and the day following the

tapping, the child always suffered from vomiting and took almost no nourishment. [No further record of case.]

CASE 2. Winiwater, 1877, four months old.

Johanna L., daughter of a day laborer living in poor circumstances, was born April 20, 1876, the seventh child of a weakly woman grown old before her time. The brothers and sisters of the infant all died either at birth or in early infancy. Reporter says nothing about possibility of lues.

Immediately after the birth of this infant the mother and midwife noticed that the baby's abdomen was unusually large. The physician in charge made the diagnosis of abdominal tumor and said the child could not live. It continued to live, however, took the breast greedily, and developed slowly. The abdomen gradually increased in size, so that at four months it was so large as to interfere with respiration and retention of food in the stomach. There was a tendency to constipation. Vomiting occurred frequently, particularly if she took her food too rapidly.

August 22, 1876, at the age of four months, the child entered the out-patient department of the Kronprinz Rudolph Kinder-spital, in Wein.

Status Presens.—Baby is thin, musculature is poorly developed, face is cyanotic. The thorax circumference is greatly increased. The abdomen is large, 65 c.m., tightly stretched, not symmetrical. The right hypochondrium is distinctly fuller than the left, but no sharp boundaries can be made out. Because of the distention palpation is impossible. The percussion note is tympanitic all over the side opposite to that upon which the child lies. There is dullness in the flanks, the exact boundaries not made out. There was no edema of lower extremities. The urine showed no albumin.

Immediate paracentesis was necessary. A trocar was introduced at a point near the left hypochondrium, where there was complete dullness. After the removal of the stylette a white fluid poured from the opening, to the great astonishment of all present. The fluid resembled milk in appearance and was the most perfect substitute one could think of—the same color, the same consistency, yes, even the same smell as fresh milk. Three liters were obtained and the trocar removed before the abdomen was completely empty. Although the fluid was thus reduced the inflation of the intestines was so great as to make examination of the abdomen difficult. The greatest prominence was still in the

right hypochondrium and the dullness reached downward from the liver obliquely across the middle portion of the right lobe of the liver through the remaining fluid. There was no change in appearance when she lay on her side. At this point, on deep palpation, a movable mass could be felt, which seemed to be composed of several parts (folds) resting on the vertebra, of the consistency of a flabby cyst. Fluctuation indefinite. Impossible to determine if tumor is attached to the liver. Upper border of the liver palpable. The mass is free from the abdominal wall and does not move on respiration.

Tappings were made as follows:—

August 22, 1876	3	liters
September 12, 1876	2½	“
November 18, 1876	Amount not given	
January 16, 1877	“	“ “

Before each tapping the child's condition was always bad; always improved after tapping. At the last tappings a “stronger” trocar was pushed through the left epigastrium and the abdomen emptied almost completely. One could now recognize the tumor plainly. Its composition was that of a soft, yielding sac. [No further account of the progress of the case is given.]

Examination of the ascitic fluid was made by Professor Ludwig, and is as follows: The fluid has no odor. It has the appearance of milk. The reaction is alkaline. On standing a long time fibrin flakes settle to the bottom of the vessel. A layer of cream lies upon the surface. The specific gravity is 1.012. The chemical analysis:—

Albumin	45.00	parts
Fat	36.80	“
Sugar	0.20	“
Chlorides	3.41	“
Sulphuric anhydride (SO ₃)	0.23	“
Phosphoric anhydride (P ₂ O ₃)	0.14	“
Phosphoric (acid) alk. earths	0.01	“
Carbonic anhydride (CO ₂)	0.484	“
Carbonic (acid) alk. earths	0.099	“
Potassium	0.24	“
Sodium	2.85	“
Calcium	0.077	“
Magnesium	0.016	“

CASE 3. Nieuwondt and Rozenzweig, 1892, in infant fifteen months old.

A case of milky ascitic fluid in a female infant fifteen months old, living in Cape Town, South Africa. May 24, 1889, he first saw the case. The child was very thin and weak, and was suffering from an attack of diarrhea and vomiting. May 30th she had recovered. June 10, 1889, she became restless and seemed to be in pain. June 11th the abdomen became distended and was very tender; tympanites. The pulse was rapid and wiry. The temperature was normal. June 20th the symptoms had become less acute. Dullness could be detected in the lower portion of the abdomen. June 28th the symptoms were practically the same, but the abdomen continued to increase in size and fluid rose in the abdomen, causing it to bulge beyond the ribs. There was now cyanosis, fever of 102°F., sweating and diarrhœa.

The case was now thought to be one of tuberculosis, tabes mesentericus. On September 25, 1889, the abdomen was tapped and 20 ounces of white, milky fluid aspirated. In two months' time the infant had been aspirated eleven times, and in all 680 ounces of the milky fluid had been removed. After this, November 5th, the symptoms abated and the child continued to gain in weight until January, when it was strong and healthy. In six months more she was above the average for her age. The author is inclined to believe that there is evidence of three distinct attacks of peritonitis in this case and that the milky fluid was due to this cause and was not pure chyle. [The child evidently got well.]

Summary of tapplings, etc.:—

September	5,	1889,	20	ounces.	Did not completely drain.
"	9,	"	40	"	
"	16,	"	80	"	Completely drained.
"	24,	"	90	"	Abdomen larger than ever. Child thin, fretful, anxious-looking, sweating freely, appetite good when not distended with flatus. Three to four loose bowel movements daily.
"	29,	"	55	"	Did not drain completely.
October	4,	"	90	"	
"	10,	"	50	"	
"	14,	"	70	"	
"	20,	"	70	"	October 26th, diarrhea.
"	28,	"	60	"	
November	5,	"	55	"	November 9th, diarrhea.
"	14,	"	..	..	Little change in abdomen, symptoms improving. See above.

680 ounces, 20,400 c.c.

Analysis of Fluid.—The fluid appeared like rich cream of milk. Specific gravity, 1.022. There was no spontaneous coagula-

tion. Neutral. Faintly sweetish odor. No pinkish discoloration. Heavy coagulation on heating. Cold nitric coagulates and when heated turns yellow. KOH increased the fluidity. Microscopic examination showed a finely granular matrix, with large nucleated cells "bearing on the whole but slight resemblance to the general character of chyle." No fat estimation made. Large amount of fat present.

CASE 4. Kaminski, 1895, in infant five weeks old.

Stanislaus G., five weeks old. Normal birth. Both parents well. Father robust, mother a well-built woman. Father denies lues. No tuberculosis on either side. Hygienic conditions in which parents live are good. Parents could give no cause for abdominal swelling. There had been no injury. This infant was the first living child to these parents. He had been well cared for, but, as they say, the children in their family do not thrive. The cause of death in their children they were unable to state. After the birth of this child profuse suppuration of the navel occurred. It is now healed.

The child is breast-fed and has a good appetite; three to four stools daily, large and good, sometimes green. A few days after birth the mother and midwife observed a large bloating in the child's abdomen, which continued to increase until it was seen by Kaminski at five weeks old.

Status Presens.—Normal build. Well nourished. No fever. Drinks well. Lung borders normal. Breathing vesicular all over. Slight dullness in the bases of the lungs behind. Heart borders normal, sounds clear and fairly strong. Pulse, 140. Respiration, 48. No edema of extremities or abdomen. The navel is healed, protrudes so that it forms a hernia. The abdomen is moderately distended in all dimensions, as is also the epigastrium. Surface is smooth and glazed, small varicose veins showed through the skin. Liver and spleen not felt. Percussion gave a tympanitic sound over upper portion of abdomen as far down as two fingers above navel; below this, dullness. Fluctuation determined with child on its back. Contour of abdomen and the dullness changed on position. Sitting or standing the abdomen protruded, etc. There is a collection of fluid in the scrotal sacs; they were almost twice the normal size. No fluctuation. No pain.

The general condition of the child seemed good, but the distention became so large that tapping was necessary. This was

done between the median line and the anterior superior spine. "To our astonishment we got, instead of a purulent fluid, a whitish-yellow fluid, which had the appearance of milk, chylous or adipose ascites. 750 c.c. were obtained. The abdomen diminished in size, the fluid in the scrotum disappeared, it drew together and the veins in the abdomen became much smaller." The fluid soon reformed in the scrotum and the abdomen gradually filled up.

Careful clinical notes of the temperature, pulse, respiration, and of the changes in size, and dull areas of abdomen were made until the middle of August, the last time it was seen by Kaminski. At times the distention became so great as to cause cyanosis and vomiting. At other times the fluid seemed to have decreased in amount. Now it seemed to be perfectly well and there were no signs of fluid in the abdomen. Urine examination several times always negative.

Examination of the Fluid.—The fluid is white, translucent and looks like milk. Specific gravity, 1.007. Reaction slightly alkaline. Coagulates three days after tapping. On the fourth day large curds form at the bottom of the vessel the size of beans, room temperature. No decomposition in four days. Fifth day an odor began. At no time did cream appear on the surface, ten days. Under the microscope many small, highly refractive bodies and some larger fat globules resembling those found in milk are seen. Very seldom does one see such small lymph cells. Ether causes the fat globules to flow together and form larger and smaller fat cells. The clots proved to be network of fibrin threads, in the meshes of which the granules and globules had been caught, as well as a few red and white blood corpuscles. No tubercle bacilli were found.

Chemical analysis:—

Albumin	2.297 per cent.
Fat	4.756 " "
Sugar	0.000 " "
Chlorides	0.195 " "

Discussion.—Kaminski was at first inclined to think the case due to lues, because ascites in young infants, fetal ascites, so frequently follows in its wake. The second supposition was that the child in consequence of its diseased navel had developed peritonitis. The nature of the fluid led him to abandon these ideas. He gives no comment as to the probable or possible cause of the

chylous fluid. In the clinical notes no records of abdominal palpation are to be found, only percussion and measurements.

Treatment consisted in the application of a plaster composed of equal parts of Ung. cinereum and emplastrum hydrargyri to the abdomen. For the weak heart action, at times he gave wine. Because of digestive disturbance, vomiting and diarrhea, hydrochloric acid.

CASE 5. Kerr, 1909, in infant sixteen days old.

Kerr reports a case in the *New York State Journal of Medicine*, January, 1909, in a child sixteen days old, as follows: Male, sixteen days old. Polish parentage. Family history negative. Father and mother in perfect health. Full term baby. Normal labor. Child in all respects normal at birth. Third day of life, after breast-feeding had been instituted, mother noticed an enlargement of infant's abdomen, which progressively increased until the sixteenth day of life, when it was admitted to the hospital, August 24, 1908.

Physical Examination.—Infant anemic, musculature flabby. Head normal size and shape. Fontanels widely open, no tension. Oral cavity normal. Well-marked fissures at angles of mouth. Slight discharge from nostrils, excoriating upper lip. No edema. Circumference of chest 13 inches. Examination of chest negative. The abdomen is considerably enlarged, circumference $19\frac{3}{4}$ inches. Wall thin, skin smooth, veins not prominent, navel healed. Palpation impracticable. Percussion.—Lateral areas of dullness with tympanitic area in the center of abdomen. Dull areas change with position. Scrotum is swollen evenly, the size of a baseball. Penis buried in swelling and cannot be brought into view. The scrotum is soft, becomes tense while infant cries. No impulse. Position has no bearing. Reduction in size on continued gentle pressure. There are two small anal fissures.

Directly after examination scrotum was tapped and 15 ounces of rich, milky fluid were withdrawn. The abdomen became lax. Fluid continued to flow from the puncture for several hours, estimated at 3 ounces. Upon admission temperature was 98.2°F. , pulse, 98; respirations, 24. Twelve hours after tapping temperature was 100°F. Pulse and respiration remained the same.

Clinical Examination of Fluid.—White, alkaline, odorless.

Specific gravity, 1,010. Profusion of fat cells and a few leucocytes. Urine examination negative.

Following the tapping the infant progressed well until the 27th of August, when the nasal discharge became profuse, lasting twenty-four hours. The infant slept soundly and cried but little. Nourishment, whey.

A rash appeared on the abdomen August 29th, having the characteristics of syphilitic eruption.

Five days after the first tapping another scrotal paracentesis was done, and 8 ounces of similar fluid were withdrawn. The infant continued to progress well. It was decided September 5th to drain the remainder. Twelve ounces were obtained.

Examination of Fluid.—Milky white, odorless, specific gravity 1,013, alkaline. Shaken with ether and filtered, filtrate is slightly opaque. Microscopic examination.—A profusion of fat cells, a few cholesterine crystals, and a few blood corpuscles, undoubtedly due to wound. Fluid has characteristics of chyle.

Urine Analysis.—Colorless, like water clouded with milk, no odor, cloudy white sediment, faintly acid, specific gravity 1,003. Urea 0.001, sugar negative, albumin trace. Indican negative. Microscopic examination.—Numerous cholesterin crystals, profusion of fat cells and very few bacteria.

September 6th, a double inguinal hernia appeared, which reduced by posture. September 19th, infant improved in general appearance, abdomen soft. September 30th, infant still improving. Scrotal sac greatly reduced in size. Small gain in weight. Stools normal. October 31, 1908, infant still alive and improving.

CASE 6. Author's case in infant seven weeks old.

Russell B., from Durand, Mich., entered the Pediatric Clinic of the University of Michigan Hospital May 27, 1909.

History.—The first born to these parents. Mother, twenty-two years old, has always been healthy, but looks pale, anemic at present. She began to menstruate at thirteen. Always regular, no miscarriages. No specific history obtainable on either side. The father is a strong, robust man. Family history negative. About the eighth week of her pregnancy the mother was confined to her bed for two weeks on account of vomiting and headache, no chills or fever, no hemorrhage. The balance of the pregnancy was uneventful until March 15, 1909, when she was seized with

pains which were interpreted as beginning labor. Her physician was in attendance most of the night. From this time until April 8th, when the child was born, she continued to have pains which simulated labor pains. These became more marked on April 8th. Her attending physician found the cervix undilated. He instituted manual dilatation, ruptured the membranes and delivered with



FIG. 1. *Author's case. Seven weeks old. Chylous ascites and chylocele.*

forceps. Presentation was normal. Child had to be resuscitated. The birth weight is said to be 12 pounds, and the abdomen to have been markedly enlarged. Two weeks after birth the mother noticed the abdomen was growing larger.* No special attention was given to this until the fifth week, when the child began to vomit. Since which time the abdomen has not appreciably increased in size. With the exception of the gradual enlargement of the abdomen the child has seemed perfectly well since birth. He nurses well, has from one to five stools daily, which the mother says always contain curds. His weight has increased markedly,

so that now, at seven weeks, he weighs 16 pounds. He has no pain, does not cry, seems happy, belches considerable gas, but passes little flatus. He has what the mother calls blue attacks, blueness of the face and neck and at times of the upper and lower extremities, particularly if he is exposed to cold.

Patient was first seen by Dr. James A. Rowley, of Durand, May 26, 1909, who sent the child to me for examination and diagnosis. The parents would not permit the infant to enter the hospital, and returned home on the first available train after my

* Doubtless chylous fluid was present in the abdomen at this time.

preliminary examination. I succeeded, however, in obtaining considerable data concerning the case. I am indebted to Dr. Rowley for obtaining many points in the history which I was unable to secure during the child's short stay in the clinic, and also for his watchful care and treatment of the case to the present time.

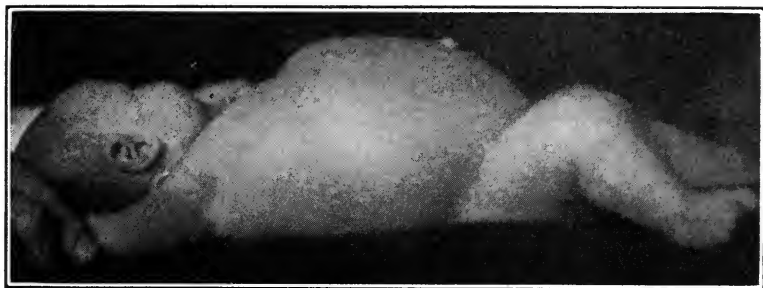


FIG. 2. *Author's case.* Seven weeks old. Showing stomach pushed upward and forward.

Status Presens.—May 27, 1909. Patient is 23 inches long, circumference of head $15\frac{3}{4}$ inches, around the nipple $16\frac{1}{2}$ inches, epigastrium 21 inches, around navel 22 inches. Well-nourished child of average sized skeleton, well-developed musculature, panniculus moderately thick. There is a dusky appearance of the face, neck and ears (cyanosis, but not marked). The mucous membranes are clean and of fair color. There are no enlarged glands, no edema; there is a fatty bunch an inch in diameter on the dorsal surface of the left foot, at base of toes, of the consistency of normal muscle tissue. Circumference of foot at this point $4\frac{3}{4}$ inches. The right foot measures 4 inches at similar point. Temperature normal, pulse normal. Respirations are slightly accelerated and shortened.

Further examination was carried on under anesthesia. The chest is of average size, the lower border of ribs flaring as if pushed up by intra-abdominal pressure, symmetrical; expansion is slight, symmetrical. Percussion is negative. Auscultation negative. No increase in the heart boundaries, no murmurs. Heart shock not felt, rhythm regular.

Before anesthesia the abdomen was symmetrically enlarged and bulged in the flanks. Just below the ensiform in the median line is a protrusion $1\frac{1}{2}$ inches in diameter, soft, tympanitic. When the patient cries it becomes tense. There seems to be some

separation of the recti at this point. The entire abdomen is tense, unyielding to pressure. On palpation it gives the sensation of large masses, which are firm, rubbery and smooth to the touch. There is a marked flatness in the flanks, with dull tympany above the navel, down to 1 finger below the navel; fluctuation very questionable; no change in dullness with position of patient.

Under anesthesia the walls became slightly relaxed. No tumor masses could be felt. Kidneys, liver and spleen not felt.

The scrotum is enormously enlarged. Left side larger than right. Greatest circumference $9\frac{1}{2}$ inches. The whole mass has a water bag feel, is tense, but on gentle and continuous pressure can be almost completely reduced, to return again when the pressure is released. Testicles could not be felt. Later Dr. Rowley reported them descended.

Radiograph of body, with colon injected with bismuth water, shows normal colon. No evidence of tumor masses in abdomen or thorax. One plate suggests fluid.

Abdomen was tapped midway between navel and right superior iliac spine; 15 c.c. of rich milky fluid were withdrawn, having no odor. After the radiograph was made the colon was flushed with water to remove as much bismuth as possible. When the milky

fluid came into the syringe the nurse, fearing it was bismuth solution, reproached herself, assuring me that she had washed all the bismuth out. However, the fluid, as I had suggested, proved to be chylous in nature, an analysis of which is given below.

Sample removed May 27, 1909: 15 c.c. rich milky fluid, no odor. Albumin, heavy precipitate with heat and nitric acid test $\frac{1}{2}$ by volume. Sugar, positive test with Fehling's solution. Treating with sulphuric acid fat globules rise to the top.



FIG. 3. Babcock test, showing per cent. of fat (7.2) in chylous fluid. Author's case.

The fluid becomes opalescent on treating with KOH and extracting with ether. Microscopic examination shows emulsion in fine subdivision, granular in appearance, the granules in active Brownian motion resembling micrococci. Fat, 9.2 per cent.

Sample removed by Dr. Rowley May 31st, received June 1, 1909. Rich milky material of the consistency of rich Jersey whole milk, slightly alkaline in reaction; specific gravity, 1.004; sugar, positive to Fehling and Nylander reagents after standing for fifteen or twenty minutes. Treating with KOH and ether it soon becomes opalescent, and after twenty-four hours is perfectly clear. Fat, 7.2 per cent., clear, yellow fat, Babcock test. (Fig. 3.) Proteids estimated as heat and nitric coagulable material after prolonged centrifugalization at high speed, 70 per cent. Fibrin, a trace. The fluid remained perfectly odorless for over two weeks and did not coagulate until after three weeks, when white masses the size of peas rose to the top like curds, completely separating from a perfectly clear liquid below. Hydrogen sulphide strong.

Sample from the scrotal sac gave exactly the same fat content. (Fat, 7.2 per cent.)

Tappings:—

May	27,	1909	...	15	c.c.	(Cowie)	
June	2,	"	...	120	"	(Rowley)	
July	8,	"	...	960	"	"	
"	20,	"	...	600	"	"	
Aug.	3,	"	...	360	"	"	
"	17,	"	...	240	"	"	
Sept.	17,	"	...	45	"	"	(scrotal sac and abdomen apparently empty.)
				<hr/>			
				2,340		c.c.	

Dr. Rowley examined patient October 27th. Since the last tapping no symptoms have occurred. Weight, 20 pounds. Child looked well nourished.

Inspection, palpation, percussion, abdomen entirely negative. Right scrotal sac at times seemed slightly enlarged. Child is now taking easily digested food at the table—cereal, baked potato, oatmeal, graham wafers. Gains weight more rapidly on this diet. Normal in every respect.

April 27, 1910. Upon my solicitation the child was brought to the hospital for examination today, with the hope of finding some definite cause for the chylous ascites. The child has been

unusually strong since birth. Held his head up between three and four months. Sat up at six months, but does not stand or bear any weight on feet at thirteen months.

Present weight, stripped, 24 pounds $10\frac{1}{8}$ ounces (11,668 grams). Perfectly well, happy, bright child. (See Fig. 4.)



FIG. 4. *Author's case.* One year nineteen days old. Seven months after last tapping.

Examination under Ether. — Length, $30\frac{1}{2}$ inches. Circumference of head, $18\frac{1}{4}$ inches. Circumference of chest, $18\frac{1}{2}$ inches. Abdomen at navel, $17\frac{1}{4}$ inches. Anterior fontanel two cm. in diameter. Scrotum, 7 inches in circumference. Right sac slightly larger than left. Normal in appearance. Both testicles felt. No hernia. Panniculus very thick, particularly over extremities. (See Fig. 4.) Skin is of a good color; no edema. Exposure to cold produces blueness of extremities. Mucous membranes good color. Mouth cavity clean. Six teeth—three upper and three lower incisors.

Seventh tooth nearly through gum. Joints normal. No enlarged glands.

Chest is narrow above, ribs slightly flaring below. Marked pigeon breast. Expansion good, symmetrical. Good resonance all over—equal. Auscultation and percussion negative.

Heart.—Apex beat neither seen nor felt. Faint heart shock. Upper border, second rib, parasternal line, right border 4 cm.

to right of midsternal line, immediate percussion, $2\frac{1}{2}$ cm. mediate percussion. Left border inside nipple line 6 cm. from midsternal line. Heart sounds quick but normal. No adventitious sounds. (See orthodiagram, Fig. 5.)

Abdomen slightly below level ribs, symmetrical, soft, easy to palpate. No tumor mass can be felt. Liver, kidney, spleen not felt. No succussion in stomach several hours after food. Complete relaxation. No signs of abdominal puncture.

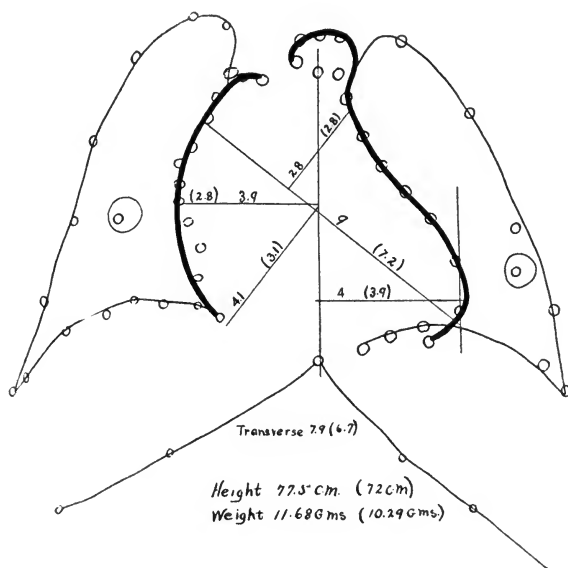


FIG. 5. Orthodiagram of author's case. The figures in brackets are the normal for height and weight indicated, according to Reyher. The other figures are the actual measurements in cm. in this case. It will be observed that Russel B. is a little taller and heavier than the comparison, which is the nearest I could obtain.

Feeding History.—Breast-fed until tenth month. Then cow's milk diluted one-third with water for two weeks. Then whole milk. At eleven months was given what he wanted from the general table, including bread, cake, pudding, meat, potatoes, apples, bananas, oranges. Craves his bread well buttered and shows marked preference for turnips.*

Discussion.—The history of cyanosis extending not only to

* Final note, April 22, 1911. Child is now over two years old; one year and seven months since last tapping. He is a perfectly well and robust boy. Walks and plays vigorously. His development has been above the average.

the face, but also to the lower extremities at times, and the increased cardiac area to the right, as shown a year later by the orthodiagram, leads me to believe the chylous ascites was due to pressure of the right heart retarding the flow of chyle into the subclavian vein and the consequent rupture of a chyle vessel below the diaphragm. Cases are on record of chylous effusions due to blocking of the thoracic duct by aneurism (Valsalva and Santorino), to thrombosis of the external jugular occluding the mouth of the duct (Virchow), to plugging of the left subclavian vein by a ragged, long-standing clot (Omerod), and to disease of the right heart producing stenosis of the left venous orifice (Peters). Stewart records a case of dilatation of the lacteals due to fatty and hypertrophied heart with diseased aortic segments and dilated auriculo-ventricular orifices. Roketansky also records a case due to dilated heart from mitral disease.

GROUP II. CHYLOUS AND CHYLIFORM ASCITES IN THE LATTER MONTHS OF INFANCY.

CASE 7. Morton, 1691, in infant two years old.

The son of Thomas Lechmer, about two years old, cutting his teeth, and in consequence of a cold got pneumonia, and for a long time was most miserably treated by an apothecary, who omitted to resort to venesection and other means necessary for a proper cure. Finally, however, through my efforts and those of my excellent colleague, Dr. Croon, although we were called in very late, by means of blood-letting and the application of cataplasms and liniments, as also by the use of lung remedies, he was partially restored. He remained, however, in poor health, with difficult breathing and cough, for the space of at least a year, after which time the poor child began to be afflicted daily with a hectic intermittent fever, and, although this was frequently dissipated by the use of Peruvian bark, yet it always quickly came back, and, as a matter of fact, at varying intervals for a whole year, recrudescences occurring even to the day of his death. From the very beginning of the fever the abdomen began to be distended with a hydropic tumor, which, strange to say, increased daily, with an increase in the cough and dyspnea. In consequence of these symptoms a severe marasmus resulted. Notwithstanding the great emaciation of the body and the acme of the hydrops (which

should be noted) he retained a robust and handsome appearance of the face, without a trace of sallowness. His appetite was substantial, if anything inclined to voraciousness, up to the very day of his death. From all this I correctly concluded, and to my friends I always expressed the opinion, that the dropsy was chylous, brought about by the draining off of the chyle into the cavities of the abdomen through the lacteal vessels, which had been broken by some accident; and that the wasting which attended it was not really pulmonary, but due to mere inanition, resultant from the withdrawal of the nutritious fluid, due to the body, from the chyloferous ducts, a rupture having been made in these. This was perfectly plain from the outcome.

Tapping the abdomen while the child was still living we extracted several pounds of lactescent chyle, just as sweet (*dulcis*) as is found in the chyle duct itself. From the postmortem examination, when we were not hindered by the difficult breathing and the persistent cough, we found the lungs perfectly healthy, without any abnormal affection, except that in the back part near the trachea appeared very numerous glands, which were quite conspicuous and hard, producing a marked pressure on the chyle duct itself, almost at the point where it reaches the subclavian vein. They were so large and heavy that, on account of the pressure so induced, shutting off the lumen of the duct, it seemed impossible for the chyle to pass into the blood, and thus, beyond doubt, it was brought about that the frail lacteal membranes lying in the abdomen being stretched beyond their resistance (the chyle continually passing and not finding any easy passage above through the chyle duct) at length were ruptured and transmitted into the cavities of the abdomen in a steady stream the chyle which was intended for the nutrition of the blood.

From what I have said it is apparent even to common sense

(1) That the tubercles or pulmonary glands, having been tumefied, arose first in consequence of the bad handling of the peripneumonia on account of the lack of timely remedies and of expectoration.

(2) Just as the annoying dry cough was brought about by the constriction of the air tubes of the lungs, due to the tubercles, so the labored breathing was due to the pressure of the extravasated chyle on the lower surface of the diaphragm.

(3) The atrophy or wasting was not really pulmonary, be-

cause, although the tubercles were there, still there was no abscess formation and they were not ulcerated, but that the marasmus was the result of chylous hydrops, attended by the steady diverting of this nutritious fluid which should have served for the building up of the body and the nutrition of the blood.

(4) The hydrops was the result of the breaking of the lacteal vessels, situated in the abdomen, and, finally, this breaking of the delicate tissue was brought about by the pressure of the pulmonary tubercles upon the upper part of the chyloferous duct.

CASE 8. Letulle, 1885, in infant thirty-two months old.

A male infant, thirty-two months old, with good family history, lues excluded. No apparent cause for the child's condition. When the child was first seen in consultation, September 16, 1884, it had been ill for about two months with a chronic affection of the abdomen. The child was poor, emaciated, pale, and the sub-diaphragmatic portion of the body was very edematous. The scrotum was tumefied and the abdomen enormously distended below the false ribs. The umbilicus, protruded by a recent hernia, was easily reducible along with the liquid which filled it. There was marked ascites, as shown by movable dullness. The subcutaneous venous network of the abdomen was distinctly seen and engorged. On palpation and percussion the liver was found to be enormous in size, reaching down beyond the margin of the false ribs and measuring at least 12 cm. on the mammary line. (There was a certain degree of double hydrothorax.) The hepatic gland was hard, very slightly tender to pressure, and pulsated synchronously with the cardiac pulsation. The pulsations were not great in volume and one could not definitely say that there were movements of expansion of the liver. The respiratory embarrassment was great enough to produce orthopnea. The face was pale and slightly cyanosed about the lips and ears. The surface veins of the neck were turgescient, beat irregularly, and could not be counted. The heart beat irregularly, 136 to 140 per minute. No murmur could be heard at the cardiac areas. There was no fever. The appetite was nil. The infant took a little milk and soup with difficulty. The urine was scanty, highly colored, no albumin, no sugar. There were attacks of nocturnal dyspnea. There was no trace of icterus.

Summary of tapplings of abdomen, etc.:—

October	6, 1884,	3.5	liters	yellowish transparent fluid.
November	5, " "	3.5	"	thicker, more milky, fluid.
December	3, " "	3.5	"	of milky fluid thicker than second. [Fluid evidently had considerable yellow color in it.]
January	28, 1885,	2.5	"	chyliform liquid, clearer and not as thick as two previous samples, having a yellowish white lactescent color, perfectly homogeneous in consistency, with no sediment on standing, and having no odor.

Total amount, 13.0 liters, or 429 ounces.

Chemical and microscopic examination of the last fluid was made and is as follows:—

Specific gravity 13 c.	1,009		
Reaction distinctly alkaline.			
Weight of dry extract at 100 c.	2.010	grams	per 100
Weight of fat	0.015	"	" 100
Weight of albumin	1.220	"	" 100
Weight of salts	0.640	"	" 100

The salts for the greater part were made up of chlorides and phosphates. The ether extract after twenty-four hours contained a certain amount of fat.

Microscopic examination showed a few "islands" of leucocytes with fatty granules, which stained black with osmic acid. The fat in the fluid was very finely emulsified.

In discussing the case the author says: "I had under my eyes either a primitive chronic hepatic affection, of which I sought the cause in vain, or an hepatic alteration secondary to a primary cardiopathy probably congenital. The second hypothesis is the more probable one. Given the symptoms presented by this patient, the liver, profoundly troubled in its over-hepatic circulation and affected in its nutrition, was perhaps surrounded by peritoneal adhesions. It is to this explanation that I incline. The physician treating the case found what he thought sufficient proof for the diagnosis of hepatic syphilis. Nothing in the family history or in the present state of the child warranted this belief."

CASE 9. Newcomb, 1889, boy of two years.

This case was never published, excepting in Dr. Busey's report. It is there recorded as a personal communication. No cause could be discovered for the chylous fluid. The fluid contained lymph cells. It was treated by tapping and was still under observation when reported by Dr. Busey. I have been unable to find a final note on the case. No analysis.

SUMMARY OF CASES OF CHYLOUS ASCITES IN SUCKLINGS

Case No.	Reported by	Date of Report	Age	Months	Sex	Cause	Character of Fluid		Duration Months	Result and Remarks
							Total Amount C. G.	General Appearance, etc.		
1	Wilhelms	1874	10	F		Cystic tumor attached to vertebral column. Supposedly a lymph gland connected by fistula with thoracic duct. Lacteal may have been ruptured during a severe paroxysm of whooping cough.	? 10 tap-pings.	Appearance of milk, "pure chyle."	7	Recovered (?); no final note on case.
2	Winiwater	1877	4	F		Cystic tumor lying on and attached to vertebral column.	5,500 4 tap-pings.	White fluid resembling milk; no odor; alkaline, creamy layer on top; Sp. G. 1.012; albumin, fat, sugar and fibrin present.	5	Recovery (?); no final report made.
3	Nieuwondt and Rosenweig	1892	15	F		Peritonitis. ?	20,400 5 tap-pings.	White, creamy fluid with sweetish odor; neutral, 1.022; no coagulation on standing; albumin and large amount of fat present; large nucleated cells in sediment.	9	Recovery; author thinks fluid bears little resemblance to pure chyle.
4	Kaminski	1895	5 W	M		Cause undiscovered; family history might suggest lues, navel infection, peritonitis.	?	Yellowish-white, milky fluid, slightly alkaline, 1.007, coagulated after standing 3 days; albumin, 2.2%; sugar, 0; fat, 4.7%; fat globules and some very small lymphocytes.	Few Months	Recovery; no final report of case; nature of fluid caused author to abandon idea of lues or peritonitis; the case looks like one of true chylous ascites, due to ruptured lacteal.
5	Kerr	1909	16 D	M		Probably congenital syphilis.	1,140	Milky white, alkaline, odorless, 1.010 to 1.030; profusion of fat cells and a few leukocytes; few cholesteuine crystals; chylous urine containing fat and cholesteuine crystals.	3	Recovery; the chyluria and chylocele suggest possibility of filaria; Masten, of Mobile, has recorded two such cases in adults.
6	Cowie	1911	7 W*	M		Probably cardiovascular.	2,140	Rich, homogeneous, milky fluid, slightly alkaline, 1.004, no odor; albumin $\frac{1}{2}$ per volume; sugar, strong test; fat, 9.2%; microscopic appearance finely granular; granules in rapid motion; fat, no cellular elements.	5 (7 tap-pings.)	Recovery complete; no recurrence after two years.
7	Morton	1891	24 M	M		Tubercular glands (bronchial) pressing on thoracic duct near its exit into vein; probably tuberculous.	"Several pounds"	Lactescent chyle, "pure as that found in chyle duct."	12	Died; the fever cause of disease, and autopsy findings point to tuberculosis.
8	Letulle	1885	32 M	M		Congenital cardiac disease.	13,000	Yellow, transparent at first, becoming lactescent later; it was then thicker; Sp. G. 1.009; albumin, 1.2%; fat, 0.015%; no sugar; alkaline.	5 (4 tap-pings.)	Recovered.
9	Newcomb	1889	24 M			Cause undiscoverable.	?	Chylous fluid, containing lymph cells; no analysis.	?	Recovery (?); a personal communication to Dr. Busey; no further notes obtainable; improved on tapplings.

* Doubtless chylous fluid was present in the abdomen as early as the fourteenth day.

CHARACTERS OF CHYLE AND CHYLIFORM FLUIDS.

Pure chyle as it flows from the thoracic duct is a milky opaque fluid having a slightly alkaline reaction and a specific gravity varying between 1,007 and 1,043, usually not higher than 1,025. It is composed chiefly of fat, proteids, fibrin, extractives and salts and formed elements. These comprise about 10 per cent. of the fluid, the balance being water. Frequently the terms chyle and lymph are used interchangeably. They are not, however, entirely identical, although they are both found in the thoracic duct in comparatively pure state, depending upon conditions under which they are obtained. The principal difference between chyle and lymph lies in the fat content. Chyle may be considered lymph laden with an excess of fat. One may accordingly obtain pure lymph from the fasting animal, chyle from an animal fed particularly on fatty food. The percentage of fat in chyle is therefore an ever-varying quantity, depending upon the character of the food ingested. This fact may be taken advantage of in the differential diagnosis of chylous and chyli-form fluids in the serous cavities.

The following table gives the analyses of chyle taken from the thoracic duct:—

Author	Hoppe. Seyler.	Owen. Rees.	Munk.	Hoppe. Seyler.	Hoppe. Seyler.
Animal	Ruptured duct, man.	Executed man.	Man during operation.	Dog.	Horse.
Fat	2.7	0.92	3.3	6.48	0.05
Proteid	3.66	7.08	3.2	2.10	2.98
Fibrin		trace	0.1	0.11	0.12
Salts	0.71	0.4	0.8	0.79	
Other organic Substances . . .	0.63	1.8		0.23	0.25
Total solids . . .	5.92	9.52	7.8	9.62	0.74
Water	94.07	90.4	92.2	90.67	95.61

The highest per cent. of fat in human chyle, recorded by Munk, is 5 per cent.; in the dog, 15 per cent. It is uniformly emulsified. The individual globules, microscopic in size, resemble

myriads of micrococci in active Brownian motion. Occasionally the droplets run together to form larger globules. The fat is made up of cholesterin, lecithin, olein, palmatin and stearin, all of which are soluble in ether after first treating with an alkali, and may be recovered from the residue of the etherial extract by appropriate measures. One thousand parts of the dried residue yield in two specimens examined by Zawilski—

	First specimen.	Second specimen.
Cholesterin	113.2	140.9
Lecithin	75.4	88.4
Olein	381.3	770.7
Palmatin	430.1	

The percentage of fat in chyle, chylous and chyloform fluids is conveniently and satisfactorily estimated by the Babcock concentrated sulphuric acid method. For demonstrating cholesterin it is usually necessary to examine the residue of the etherial extract. In the event that a large amount of fat is present this must first be extracted with alcoholic KOH; boiled, and evaporated to dryness, soaps are formed. The residue is now dissolved in water, ether extract made, evaporated to dryness, and the residue redissolved in boiling alcohol, partially evaporated and set aside to crystalize. Typical cholesterin crystals, plates, form and give a red to blue color when treated with a weak solution of sulphuric acid.

The proteids of chyle are chiefly serum albumin and serum globulin. These are coagulated by heat; a drop of HNO_3 brings a yellow color. (Xanthoproteic, or Mulder's reaction.) Fibrin is demonstrated by the ability of the fluid to coagulate. Pure lymph coagulates very rapidly, chyle less rapidly. There is always present in chylous fluids which do not coagulate readily a certain amount of fibrinogen, which will coagulate on addition of some blood serum. In chylous fluids, after several days' standing or in some cases even longer, curd-like masses separate out and rise to the top, leaving a whey-like layer below. These masses, which vary in size up to that of a pea, are sometimes made up of a fibrin network, in the meshes of which are entangled the emulsified fat, etc.

Sugar is a normal constituent of chyle. It is present in the

same proportion as the sugar of the blood. Sometimes larger quantities may be demonstrated. A chylous fluid must not be considered sugar-free unless Fehling's solution is not reduced after one or two hours, and the fermentation test is negative. There are other substances present in some chyliform fluids which will reduce Fehling's solution.

Microscopic Examination of Chyle.—Through the work of Biedl and Decastello, Selinoff, Crescenze, and others, and more recently of Rous, it has been conclusively shown that the thoracic duct is the chief pathway of the lymphocytes to the blood. These cells, as Rous points out, vary in their number according to whether the animal is at rest or in activity, the number being greater during exertion. Polymorphonuclear cells and red blood cells, if present in any appreciable number, are due to contamination. One must, therefore, not expect to find large numbers of these cells in a pure chylous effusion. He must also not lose sight of the fact that inflammatory affections associated with increase in the leukocytes might also be the cause of a rupture of one of the chyliferous vessels. In a recent text-book the statement is made that there is little use of going into a detailed description of chylous fluids, as they are almost invariably due to carcinoma or some malignant disease of the abdomen.* It has been definitely proven that a milky effusion may be due to a large content of epithelial cells or cells which have undergone fatty degeneration. Cells undergoing mitosis are not normal constituents of pure chyle. In chylous ascites due to constriction of the thoracic duct it would seem probable that the total lymphocyte count of the blood would be relatively decreased and a relative leukocytosis result. A reduction of 79 per cent. was observed by Biedl and Decastello after ligation of the lymphatics on both sides of the neck in dogs.

One must conclude, it would seem, that chylous and chyli-form ascites in sucklings is a very rare condition; that instead of regarding it a disease entity it should be considered a symptom-complex dependent upon one of several possible etiologic factors. The etiologic factor to a great extent determines the outcome of the case. Evidently those cases due to some cardio-vascular anomaly or non-inflammatory or cystic condition tend to com-

* This, as well as similar statements found elsewhere, gives me the excuse for incorporating this section on the characters of chylous and chyliform fluids in this report.

plete recovery, while those due to intrathoracic and intra-abdominal growths, such as tuberculous glands, and to inflammatory conditions, tend to dissolution.

The writer wishes to express his thanks to Professor Earle W. Dow for verifying and correcting the French translations, and to Dr. L. F. Warren for the excellent orthodiagram.

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DISCUSSION.

DR. BOVAIRD.—I would like to ask the doctor what were the evidences on which he termed it chylous? There are two different types—one true chyle and the other due to degeneration of the cells in the fluid giving the appearance of chyle.

DR. ADAMS.—Some time ago I assisted Dr. Busey in the construction of his book on "Diseases of the Lymph Channels." I was his student and could present the doctor with a copy of the book. The cases were collected with a great deal of trouble and expense and a considerable amount of research work was done. I am very glad to know that his work is not forgotten.

DR. COWIE (closing): Dr. Busey's work is certainly most delightful. The scholarly manner in which he went about it is very fine.

In answer to Dr. Bovaird, all the analyses are given in the paper, but were not referred to in the presentation. Chylous ascites and chyliform ascites are entirely different things. Chyli-form ascites is what we find in chronic peritonitis and carcinoma for instance. In true chylous ascites we must, of course, get the elements of chyle in the fluid. If you starve a dog you can get pure lymph from the thoracic duct; if you feed the dog fat you get chyle. In true chylous ascites, as in this case, we might expect the percentage of fat to vary from time to time.

Another point I wanted to bring out was the importance of blood analysis in this child. I believe that in these cases we should get a relative lymphemia. The lymphocytes get into the blood through the thoracic duct; accordingly if there is an obstruction of the duct it seems reasonable to expect a decrease in lymphocytes in the blood. We might also expect to find increase of lymphocytes in the chylous fluid; unfortunately no blood counts were made in my case; I had to hunt over several spreads made from sediment of the chylous fluid in order to get a hundred cells. These were all small lymphocytes.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, Held April 13, 1911.

DR. WILLIAM SHANNON, CHAIRMAN.

OUTDOOR SLEEPING DEVICES IN CITIES.

DR. S. ADOLPHUS KNOPF read this paper, and demonstrated the devices he described. In order to make the open-air treatment of tuberculosis, pneumonia or nervous diseases feasible, even in the homes of the poor in cities, Dr. Knopf had devised a window tent, which was attached to the inside of the room instead of the outside of the window. It was so constructed that the air of the room could not enter or mix with the air in the tent. The tent was attached to the frame of the window, but did not entirely fill the lower half—a space of about 3 inches was left for the escape of the warm air in the room. This space could be reduced to 1 inch or less. A piece of transparent celluloid was placed in the front of the tent to serve as an observation window for the nurse to watch the patient if this was necessary. During the day the window tent could be pulled up and the window closed if desired. This window tent was of the greatest service to the tuberculous patient, for he could take his open air treatment even in the cramped quarters of a city tenement without causing the remainder of the family to suffer with the cold. Dr. Knopf spoke of the necessity of plenty of covering for the patient. He should wear a sweater and protect his head and ears with a woolen cap. Dr. Knopf said he was indebted to the Starnook Company for the construction of a device which was suitable for a rest in the open air by day and for outdoor sleeping for night. He had used one himself since October, 1910. The Starnook consisted of three walls composed of frames holding movable slats, of a roof and a floor. It was all made of galvanized iron, except the floor, the window sash and the roof-frame. The wall of the house enclosed the fourth side, through which access was had to the Starnook. It was about 9 feet long by 6 feet deep by 6 feet high at the outer side, and 8 feet high at the inner side. The roof could

be completely raised against the walls of the house and an unobscured view of the sky could thus be had. Three upper sections of the front shutters could be entirely opened, making a typical rest-cure veranda during the day. The slats were so constructed as to secure absolute privacy, and in stormy weather could be tightly closed. Even when so closed there were enough open spaces to allow the freest circulation of air. Many conveniences could be added to this arrangement, such as electric light, electric motor contrivances for manipulating the various sections of slats, etc. For those who could not have this convenience a large beach chair could be fitted with canvas so as to protect the patient from winds, and render him very comfortable, even admitting of his having a table for books, writing material, meals.

A DEMONSTRATION OF A NEW METHOD OF SECURING PURE AIR IN TENEMENTS.

MR. HENRY ATTERBURY SMITH, architect, made this demonstration and stated that this new method of building stairs in tenements was brought about through suggestions made by the doctors. Charts were shown of the Vanderbilt tenements on 77th Street and East River. They are now almost complete. In Hoboken, where the congestion is very thick, they have erected a group of buildings modelled on the same plan as the Vanderbilt tenements. Ten years ago the Charity Organization Society offered a prize for one who could bring about a law that would call for an open passageway and other conditions which provided fresh air all the time. Mr. Smith presented pictures showing what had been accomplished. The entrances in these tenements were 100 feet apart. They had glass roofs. The entrances were into a court, and the ascending staircase was nearly always in contact with the fresh air. They were so arranged as not to be open to abuses or to conditions of immorality. It was interesting to note that, in case of fire, one hose could send water from one staircase to ninety-six doors. The toilets were arranged according to law. The shaft, however, was the disagreeable feature and should be abolished.

The following resolution was introduced by Dr. A. Jacobi, duly seconded by Dr. Hermann M. Biggs, and was unanimously carried:—

“WHEREAS, in the Tenement House Law there is no recognition of the new open-air stairway, and

"WHEREAS, the air shaft becomes superfluous in open-air stairway construction of tenements as illustrated by the buildings in 77th Street and the East River, and

"WHEREAS, the air shaft, besides being superfluous for the purpose of ventilation, takes from the living quarters needed room space and is, furthermore, a possible means of close communication between adjacent compartments, transmitting noise, possibly dust, germs and fire; therefore, be it

"*Resolved:* First.—That it is the sense of this meeting that in buildings having open stairs of this type the shaft should not be required and that bath-rooms be allowed to ventilate upon the open stairs, and

"Second.—That it is better to locate and ventilate the bath-rooms on the open stairs rather than to locate them on the outside walls of the buildings, as this space is better utilized for bed-rooms, living-rooms and kitchens, and

"Third.—That a copy of this resolution, after endorsement by the Council of the Academy of Medicine, be forwarded to departments having jurisdiction."

DR. JACOBI said that he had inspected the Vanderbilt tenements and thought that the air shafts were unnecessary and took space away from the rooms. They were, in his opinion, quite superfluous. He did not think there would be any difficulty in having laws passed regulating the construction of such buildings. The plans looked to him both simple and sanitary. There should be no difficulty in convincing the authorities that the building laws as they now stood were in need of change.

DR. HERMANN M. BIGGS said that he had not visited these new tenements, but that Mr. Smith had submitted the plans to the Superintendent of Construction, Department of Health. Formerly the construction of tenements and the plumbing were under the supervision of the Department of Health. It was the opinion of everyone that these air shafts were unnecessary; in fact, that they were a distinct detriment to the houses so constructed.

REMEDIAL AGENTS OF VALUE IN THE TREATMENT OF PNEUMONIA IN CHILDREN.

DR. W. P. NORTHRUP read this paper, which he stated had been written for the purpose of provoking discussion and not

as an encyclopedic article. In sustaining the heart and vessels to keep the blood pressure up to the efficient degree for the seven to twelve days' strain he considered the open, cold air most valuable. Clinically, it had been proved that this was true. Experimentally, the explanation of this efficiency had been demonstrated by Howland and Hoobler. The proper performance of all functions of the body, glands, muscles, and all tissues had to be backed by a certain blood pressure. Patient slept, retained a clear, bright color, took food, breathed freer, passed the crisis in better form and entered convalescence in better condition by having been continuously in cold, bracing air—winter outdoor air. Dr. Northrup did not think otitis media was any more frequent in patients inhaling the cold air in the open. He was sure that otitis was more common in institution groups of bronchopneumonia patients than in sporadic cases in households. He thought nothing was so bad for a bronchopneumonia case as a warm, middle room or a crowded warm ward. No matter what one did with a single case he was liable to be sorry. A case proved nothing, but ten, twenty or thirty years of experience was a basis of conviction. He wished to put the question as to what experts said in regard to putting in the open air pneumonia, scarlet fever, diphtheria, influenza, pertussis, laryngitis and otitis media. Such a discussion might aid many a practitioner to omit some time-honored, annoying and useless treatment and to substitute a modern helpful one. Dr. Northrup no longer used the pneumonia jacket and rarely used the poultice, except for pain. Abdominal distention was one of the most distressing features of pneumonia. He had found injections of milk and molasses, 3 ounces each, were most effective in relieving this symptom. He also recommended hot high saline injections and turpentin emulsion by injection. In considering pneumonia with tendency to heart failure, the writer said that this might mean different things to different people. When a patient's color changed so that a nurse noticed it, either to a leaden or to a pale color, with a tinge of cyanosis and the heart became rapid, that heart was dangerously bad. Early in the disease the toxins acted like an alkaloid tonic or stimulant. At the end of a week it might be that the need of a stimulant became apparent. Even a little before the stimulant should begin. He recommended the use of digitalis first, tincture or fluid extract, later strophanthus, alternating dose and dose. After this strychnin and whiskey. The best heart tonic

was cold, open, fresh air. The best first emergency stimulant was a hot foot bath; the second a hot saline and whiskey bowel injection. The third was a hypodermic injection of camphor, caffeine, adrenalin or glonoin. The treatment of pneumonia had entirely changed recently, and Dr. Northrup hoped that the discussion would show where they now stood.

DR. HERMANN M. BIGGS said that he felt out of place in undertaking a discussion on the treatment of pneumonia in children and that he would refer to only one phase of the subject. He thought they were under great obligations to Dr. Northrup for the emphasis he had placed on the treatment of affections of the respiratory tract and other affections of children by the open-air methods. In the Health Department they had come to believe more and more in the treatment of the diseases with which they were called upon to deal with open air. At Otisville, where they had established a sanatorium for the tuberculous, they had learned that they could take patients from the tenements, place them outdoors, and while they might suffer somewhat from the intense cold there was no distinct detriment to their condition. The results were always favorable, and at the end of a week or ten days they became accustomed to the open-air life and it was not at all objectionable. Sometimes 3 or 4 inches of snow would fall on the beds on which they slept. Since this institution had been opened, five years ago, there had never been a single instance of any severe acute affection of the respiratory tract as the result of exposure to fresh air and the cold. Four years ago, when the mortality at the Kingston Avenue Hospital, in Brooklyn, was so high, probably caused in part by the crowded wards, the Board of Health decided to build some temporary shacks and to place in those the patients afflicted with bronchopneumonia, keeping them in the open air as much as possible. The results were most gratifying. They found that the patients having severe bronchopneumonia and the septic complications of measles when taken from the wards and placed in the fresh air did much better. Many of them went into convalescence without any serious trouble after removal from the wards of the hospital. Now there were in course of construction two pavilions, which would contain 160 beds, at the Riverside Hospital, and these would be used for contagious diseases and pulmonary tuberculosis. In East 16th Street there were 320 beds, and one side of the

ward was as open as it could be made. Dr. Biggs believed that this method of treating contagious diseases, as well as all forms of infection, was the one they must follow in the future. Dr. Biggs had visited Dr. Northrup's wards at the Presbyterian Hospital, and notwithstanding the exposure to the open air the patients showed that only favorable results followed.

Dr. Biggs said he believed that in a well-ventilated room infections could not be carried far. He had visited many of the hospitals for contagious diseases in Europe and was impressed with the fact that they did not separate the various forms of infection as they did in this country. In Paris, where the infectious diseases were cared for all forms were looked after in the same pavilion, but with glass boxes 8 by 10 feet that opened into a corridor. In accordance with the suggestions obtained patients were not being separated by glass and wood partitions. At most, there were only two beds to a stall.

DR. CHARLES GILMORE KERLEY said that in assuming the care of any child afflicted with pneumonia, there were many things which should be taken into consideration. The child's condition was temporarily changed; there existed something which depressed the child's vitality to the utmost. A child with fever had a lessened digestive capacity, and if the food usually taken was continued there would result in many cases intestinal toxemia and a ballooning of the abdomen. Some laxative should be administered, preferably castor oil. The diet should be reduced. Fat milk should not be given. The food should be reduced in amount at least one-half or two-thirds so as to avoid the toxemia and the distention of the abdomen, which caused compression upon the diaphragm. The ordinary clothing should be worn, and not the oiled silk or other jackets which made the child so uncomfortable. The child should be kept as quiet as possible; he was very susceptible to nervous influences when well and much more so when ill. He should get food and rest at stated intervals. Only one person should be allowed in the sick room at a time. The child should not be fussed over, and it would be better to keep members of the family from the room. To make the child comfortable often a Dover's powder or a cold compress might be required.

With regard to fresh air, Dr. Kerley said he was not yet willing to place patients with true laryngeal inflammations on the roof and in the open; these cases did not do well in the cold

air. The element of spasm should be borne in mind, and this was increased when the child was exposed to the cold. In bronchial asthma, the cold air might make the respirations more rapid; if the air was fresh, but not cold, the breathing was more easy. Exposing the child with bronchial asthma to the extreme cold he did not believe in. If one placed a child in quiet quarters, with proper feeding, with plenty of good and fresh air, with freedom from overtension, one had all that was necessary for his good in many cases. If, however, the child was very sick, something must be done in the line of drugs. The giving of expectorants, syrup of ipecac, of tulu and other such stuffs certainly tended to upset the child's digestion, diminished his capacity for taking food, and took from him a certain amount of energy. Whatever food was ordered should be selected so as not to compromise the child's digestive capacity.

There were many cases that required cardiac stimulation because of bad management; some children were in a toxic state from causes not due to the disease itself. When stimulants were required, they should be given by the hypodermic method, because the stomach could not be relied upon. With a pulse of low tension and irregular, Dr. Kerley said he knew of no better agent than strychnin. He did not like to use digitalis because it tended to upset the stomach so. Alcohol should be held in reserve until the seventh, eighth or ninth day of the disease, and then given only when other medication failed; when given it should be in large doses. It was surprising how much alcohol these patients could take and retain, and without any signs of intoxication. He cautioned against the administration of alcohol early in the disease; give it late in the disease if at all. It was an agent to hold in reserve. Hydrotherapy, the cold pack, or the modified pack, were means of improving the heart's condition.

DR. ROWLAND G. FREEMAN said that the old belief that measles was to be treated in the dark because of danger to the eyes had no ground at all; the eyes of patients with measles did as well in the light as in the dark. The bright sunlight did not harm the eyes of patients with measles any more than it would if they did not have the disease. A patient with measles should be placed near the open window, but the direct rays of the sun should not fall on the patient's eyes. Draughts were not to be feared. There should be plenty of sunlight and fresh air, things

that were very difficult often to provide in many families. The results of this treatment were often surprising. The low mortality rate in many institutions was due largely to the fresh air. One should endeavor always to have open windows, sunlight and fresh air; wonderful results often followed this treatment.

With regard to measles pneumonia, when the disease first appeared calomel should first be administered, and a mustard paste applied to the chest. Plenty of fresh air and sunlight should be allowed. The patient should be kept quiet. Fresh air did as much good as steam inhalations. A bronchitis was not a contra-indication at all. In cases with a moist skin, exposure to the open air would soon cause the skin to become dry.

DR. B. RAYMOND HOOBLER said that through the courtesy of Dr. Howland he had had the opportunity of observing the blood pressure on several hundred children in his wards at Bellevue Hospital. The observations had been on children with various diseases and in various stages of such diseases, taken indoors and after being in the open air. The findings which he reported applied only to lobar and bronchopneumonia, but were applicable to nearly all forms of acute respiratory conditions. The children when they were placed in the open air were properly protected with warm clothing, only their faces being exposed. The results might briefly be stated as follows:—

As a general rule the blood pressure was increased when a child was removed from a warm ward to the open air. The amount of such a rise was dependent upon several factors:—

(1) The more sick the child the higher was the rise of pressure.

(2) The higher the patient's temperature the higher the rise of pressure.

(3) The warmer the indoor temperature and the colder the outdoor temperature, the greater would be the rise.

(4) The lower the blood pressure before placing the child in the cold air, the higher would be the rise.

(5) The blood pressure remained high as long as the child was left in the open air.

(6) Drugs which had the effect of raising the blood pressure indoors 15 mms. of mercury would have but little effect if given when the patient was out-doors after the maximum effect of the cold had been reached.

(7) The maximum effect of cold air was reached after about two hours in the open air.

(8) Blood pressure fell gradually when the patient was brought indoors and reached its minimum after about two hours.

(9) There was no dropping in the blood pressure below the usual indoor pressure, as was the case with many vasomotor stimulants when the patient was brought in from outdoors.

(10) Infants did not respond as well as did the older children.

(11) The pulse and temperature would remain about the same, the only difference being in the blood pressure, which accounted for the value of the out-door treatment.

DR. A. JACOBI said that Dickson, in 1836, wrote a book on the mortality and morbidity of pneumonia in children, and he stated that, at that time, of 35 patients only 1 remained alive; today, out of the same number it was found that only one died. The difference in the mortality was, of course, due to the different methods of treatment. When Dr. Jacobi entered into practice of medicine it was the custom to keep the rooms warm, the windows closed, and the temperature of the room was kept high. Water was not given the sick, but warm teas were. The children were kept warm and covered—in fact, they were not ever uncovered. This was sixty years ago.

Fat milk should not be given in any acute infectious disease; the carbohydrates were the proper food to give. Many cases of pneumonia got along without any treatment, but it had always been a question with Dr. Jacobi whether getting well without treatment with drugs meant that these patients really did get well. When a patient was ill with an acute infectious disease, suffering from symptoms which lasted ten, eight or even five days, with a high temperature that remained unchecked for such a length of time, it was a mistake to believe in no treatment. High temperatures in these diseases injured the patient's vitality—injured the myocardium. It was his practice not to wait until things turned up; he did not believe in "Micawberism." Pay some attention to the heart. Give digitalis in the beginning of the disease, or strophanthus, or both together. Babies who were wakeful should not receive caffeine. He believed in giving opiates to children; as good results were obtained in children as in adults. The best stimulant, however, was camphor given hypodermically

—one part of camphor to four parts of sweet almond oil (not olive oil).

In cases of pneumonia which did not readily undergo resolution, with thickened expectoration, etc., inhalations did well, especially with turpentine. The crude turpentine obtained from paint shops was what should be used. He had also used with success inhalations of chloride of ammonia; this salt was burned on a living coal or placed in a hot oven or stove. It aided very much in expectoration and was well worth trying.

DR. HENRY KOPLIK said that the tendency in pneumonia, as in typhoid fever, was to get well. The mortality in pneumonia differed according to the age of the patients; above the age of five the disease was quite benign. In different epidemics the disease gave different reactions. It should be borne in mind that pneumonias in children had a tendency toward recovery, but they also had a tendency to spread to both lungs, and many of such cases died. Good results were had from placing children where they could get plenty of fresh air and good ventilation.

VINCENT'S ANGINA.—In a study of 32 cases J. D. Rolleston (*British Journal of Children's Diseases*, July, 1910) states that Vincent's angina is an uncommon disease, occurring in 0.9 per cent. of all cases of sore throat, and in 4.9 per cent. of cases of non-diphtheritic angina. During a five years' period of observation in a hospital population of all ages, the affection was confined to children between two and sixteen years. No instances of contagion were observed. Its incidence was greatest in the spring, least in the autumn. It was not found to show any predilection for weakly children or for cases of oral sepsis. There is nothing characteristic in its prodromal symptoms. There are not two distinct varieties of Vincent's angina. The ulcerative is merely a later stage of the membranous form. Constitutional symptoms are slight or absent, but the local affection is more pronounced than in diphtheria. Association with other diseases is uncommon. The prognosis is favorable. Complications are infrequent and usually insignificant. Treatment consists in the local application of tincture of iodine or methylene blue powder. Internal medication is usually unnecessary.—*American Journal of Obstetrics.*

MISCELLANEOUS.

INFANT MORTALITY LARGELY A PROBLEM OF HOUSING.

BY HENRY ATTERBURY SMITH.

- During the semi-tropical heat of our New York summer it is pleasing to note that the Pediatric Section of the New York Academy of Medicine came to the rescue in a housing matter that affects immediately the tenement law of our city. Through the interest of Dr. A. Jacobi and Dr. Hermann M. Biggs a resolution of the Academy has caused certain corrective, progressive and scientific measures to be introduced at Albany affecting the open-stair type of building.

HISTORY.

Years ago, in 1900, a prize was awarded to the writer for the "open-stair" idea by the Charity Organization Society at the time when, during Theodore Roosevelt's administration at Albany, an effort was being made to frame a new tenement law and establish a separate city department. Previously, the duty of looking after our tenements was divided between the Health Department and the Building Department.

This prize plan remained dormant until 1909, when Mrs. William K. Vanderbilt, Sr., embraced it for her tenements in 77th and 78th Streets, east of Avenue A. Since that it has been used by the Open-Stair Tenement Company, the Hartley Open-Stair Tenement Company, in the John Jay Dwellings opposite Mrs. Vanderbilt's buildings, and at 525 to 531 West 47th Street. In the state of New Jersey it is being built by the Stevens Estate of Hoboken.

THE AIR SHAFT.

But all this time, in consequence of the lack of authority in the Health Department, and through the lack of appreciation in the Tenement Department, a certain intercommunicating, disease-breeding shaft had to be introduced and built into all these buildings. This was because the law of ten years ago, not recognizing the benefits of open stairs, read: "A toilet must ventilate upon a street, yard, court or vent shaft." The "open stairs," as constructed, were as good as a court, much better than a shaft. But there was the law, a stumbling block. Nobody could create enough interest to suggest a remedy.

Dr. Henry L. Shively, who had been interested in the Vanderbilt tenements, foresaw that the shaft demanded by law was a menace to health, and under date of May 28, 1910, wrote to the author as follows:—

“You have made a gallant fight for the elimination of the shaft and for the preservation of the periphery of the buildings for living purposes. I think under any circumstances the shafts should not be built—a feature so unanimously condemned by all that there is no logical escape from the situation created—you should not build them, even if this involves shifting the location of the two bathrooms to the position indicated as B. (upon the periphery). I fully agree with you as to the desirability of the original plan, but in any case, if you cannot win your point in the Tenement Department, then I say by all means, and at almost any sacrifice, leave out these shafts which you yourself have so vigorously condemned.”

The writer, however, called upon Dr. Walter BenseL and others and was encouraged to believe that some day some light would come to the Tenement House Department that would help the unfortunate situation. The buildings proceeded imperfectly, however, with the shaft in, according to law.

It was not until Drs. Northrup, Winters, Kerley, Stowell, Crandall and others, considering the matter as independent practicing physicians of our city, determined that the situation was important enough to warrant an expression of opinion from them, that further steps were taken. The Chairman, Dr. Shannon, invited the author to appear April 13th before the Pediatric Section of the Academy of Medicine with lantern slide illustrations, so that the whole section could determine on the matter. (See p. 621.)

This action, however, needed support, and it was a great satisfaction to the writer to see it forthcoming. Never before had a serious body or any individual pointed out, as in the second part of the resolution of the Academy, that the toilets were in any case in the right place, shaft or no shaft, and that the outside wall space was of too much value for living purposes to waste an inch of it for toilets.

TENEMENT ECONOMIES SOCIETY.

Immediately upon the action of the Academy the Tenement Economies Society, headed by Dr. Charles F. Chandler, first

President of our Board of Health, supported by Mr. Jacob A. Riis, author of "How the Other Half Lives"; Mr. Geo. B. Post, member of the former Gilder Tenement House Commission; Mr. Wm. Jay Schieffelin, Mr. Geo. F. Canfield and Borough President McAneny caused to have introduced at Albany the Economic Tenement Bill. This bill was submitted to various real estate and philanthropic societies, and the Academy's action was universally welcomed as a great benefit to our community in a very wide field.

THE EFFECT.

The bill eliminates the air shaft and makes a form of tenement possible that is going to revolutionize tenement construction. And we shall soon see one cause of infant mortality reduced to a minimum. No interior hall nor dark passage will remain in future buildings of this type. There will be no intercommunicating shaft nor current of air of any kind between one family and the next. Even the dumbwaiters run up and down in the fresh air. Isolation is perfect. The street is practically brought to each door.

Now that this matter has had the attention of the Academy of Medicine and the Board of Health, many tenements have been projected and soon statistics will show how beneficial to children and infants, especially in summer, this type of construction is, with its cross ventilation in light and cheerful apartments afforded by the most simple and economical construction available.

POSITION OF THE APEX-BEAT IN CHILDREN.—In examining 500 children, J. E. H. Sawyer (*British Journal of Children's Diseases*, December, 1909) found that the apex-beat is normally situated without the mammary line up to the third year, in the mammary line from the third to tenth year, and that after this age it gradually assumes the position found in the adult. Even at the age of fifteen years the apex-beat is found in the mammary line in almost a third of the cases, but this large percentage is probably due to the bad development of the chest in many of the children. That the apex-beat of children is situated further out than in adults is generally recognized, but it is not usually accepted that this outward position remains during such a long period of the child's life.—*American Journal of Obstetrics*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. CHARLES E. FARR.

DR. S. FELDSTEIN.

DR. ALFRED F. HESS.

DR. G. R. PISEK.

DR. FRITZ B. TALBOT.

DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

HASKIN, W. H.: A REPORT OF A FEW CASES OF OTITIS MEDIA SUPPURATIVA TREATED WITH SUSPENSIONS OF LACTIC ACID BACILLI. (*Annals of Otology, Rhinology and Laryngology*, March, 1911, p. 49.)

The instructions as to the use of the solution are as follows: (1) Syringe aural canal carefully with a warm saline solution and wipe dry. (2) Patient should then lie down with the diseased ear uppermost, the canal filled with the suspension, which should be left in at least fifteen minutes before wiping out. Continue this method twice daily, then once daily when there is improvement noticed. (3) It is important to use fresh cultures.

Of the 17 cases tabulated, the first, child of eleven years, with a history of profuse bilateral aural discharge for two years; in five visits both ears became dry and odor ceased. Fourth case, a child of four years; foul discharge for three years; much improved on third visit, but passed from observation. Sixth case, child of six years; profuse purulent discharge for two weeks; marked improvement in four days, then disappeared. Thirteenth case, child of nine years; profuse discharge for three months, under treatment two weeks, and later wrote that ears were well. Fifteenth case, child of eleven years; postoperative mastoid case with both cavities foul; result *nil*. Seventeenth case, child of seven years; old mastoid wound of eighteen months' duration never healed; result, complete cure in four days. S. W. THURBER.

DENCH, EDWARD BRADFORD: CASES OF AURAL SUPPURATION PRESENTING IRREGULAR SYMPTOMS. (*Annals of Otology, Rhinology and Laryngology*, March, 1911, p. 129.)

This article is a report of 3 cases, the first of which is that of a boy of twelve years upon whom a radical mastoid operation was performed for an old otitis media. Four days after the operation he developed nystagmus toward the healthy side, together with a slight rise in temperature. A slight infection of the wound

was thought sufficient to account for the temperature. The wound was opened and a wet dressing applied. For three days the morning temperature would be normal and rise to 102° and 103° F. in the afternoon. Rotation showed that the labyrinth on the affected side was dead. Blood culture negative, though the original infection was streptococcic. A sinus thrombosis was suspected, but not found on operative inspection. As the range in afternoon temperature became greater—up to 104° F.—the internal jugular vein was removed. It contained no clot, but was somewhat thickened at its upper end. A blood culture at this time showed streptococci. This is in opposition to the rule that removal of the jugular causes a disappearance of the streptococcemia. The patient never had a streptococcemia until after the jugular was removed, yet the removal caused the abatement of all symptoms of thrombosis. Complete recovery followed. The laboratory findings in this case were not as much to be depended upon as the clinical symptoms. S. W. THURBER.

SURGERY.

MACCARTY, WM. CARPENTER, AND MCGRATH, BERNARD FRANCIS: CLINICAL AND PATHOLOGICAL SIGNIFICANCE OF OBLITERATION, CARCINOMA AND DIVERTICULUM OF THE APPENDIX. (*Surgery, Gynecology and Obstetrics*, March, 1911, p. 211.)

The authors after a careful study of 5,000 appendices in the Mayo clinic found obliteration of the tip of the appendix as early as five years of age and complete obliteration at ten years. From the case histories and a study of the microscopic findings they conclude that the process is inflammatory in nature, and not a normal involutional change. Obliterative appendicitis was found associated with gall stones in a child of fourteen years and a total obliteration, associated with gall stones, in one of seventeen years. A carcinoma of the appendix was found in a girl five years of age, suffering from acute appendicitis. A general series of cases showed carcinoma in about 2 per cent. of all cases of obliterative appendicitis, and the authors therefore urge the removal of all appendices of this type. Diverticulum of the appendix, a much rarer condition, was found in one boy of eighteen.

CHARLES E. FARR.

MEDICINE.

HOENIGER, ERICH: ON EPIHEMERAL TRAUMATIC GLYCOSURIA IN THE NEWBORN. (*Deutsch. Med. Woch.*, March 16, 1911, p. 500.)

The author of this paper states that after a labor involving marked trauma, for example, high forceps delivery, there is a temporary glycosuria in the urine of the infant. This investigation is interesting and well worthy of confirmation upon a larger number of cases.

ALFRED F. HESS.

AUSTIN, A. E.: ON THE DEPENDENCE OF INTESTINAL INDIGESTION ON GASTRIC DISTURBANCES. (*Boston Medical and Surgical Journal*, March 9, 1911, p. 327.)

It may be said from a study of the cases that diarrhea does not always accompany an achylia nor a hypochlorhydria, nor from the presence of connective tissue in the stool can we always deduce the state of the gastric juice. Furthermore, while hyperchlorhydria is usually accompanied by constipation, we may have diarrhea or the bowels may be regular, while with gastric myasthenia constipation is the rule, as it is in hypersecretion. A functional chronic catarrh of the small intestine may exist associated with any of these gastric conditions, with excessive or no free HCl and with increased or impaired motility so that we can only say that improperly prepared food is poured into the small intestine which, either on account of this extra burden or on account of some antecedent inflammatory disturbance, undergoes a functional impairment that usually manifests itself by the increased motility.

FRITZ B. TALBOT.

WARTHIN, A. S.: CONGENITAL SYPHILIS OF THE HEART. (*American Journal of the Medical Sciences*, March, 1911, p. 398.)

Warthin's purpose is to show that there exists an especial form of interstitial myocarditis, localized or diffuse, due to the presence of the spirocheta pallida, and resulting from congenital infection. The myocarditis may exist independent of any other sign or symptom of congenital syphilis. It is also, he believes, an important cause of asphyxia neonatorum, the unexplained sudden death in early life. The condition may be associated with infantilism or less severe grades of underdevelopment. He bases

his conclusions on the autopsy material of 12 cases. In only 1 case was the clinical diagnosis of congenital syphilis made, and in this case no affection of the heart was suspected. His work shows that localized patches of interstitial myocarditis can exist without causing notable changes in the gross appearances. A common feature is the occurrence throughout the myocardium of few or numerous light-staining patches separating or replacing the muscle fibers and made up of the fibroblastic or myxomatous tissue. The plasma cells and cells of the lymphocyte type are markedly infiltrated. The most prominent feature was the fibroblastic or epithelioid proliferations of the stroma along the course of the smallest vessels and apparently arising from their walls or from the vascular tissue. The condition differs from the common variety of acquired syphilis of the heart seen in adults. It was the discovery of the spirochetæ in large numbers that first led to the recognition of this condition. Gummatous formation and giant cells were never found. One very important point established was the occurrence of the syphilitic changes in the heart without lesions of congenital syphilis elsewhere.

He concludes that congenital syphilis of the heart occurs most frequently in the form of interstitial myocarditis due to the presence of *spirocheta pallida* without producing characteristic macroscopic changes, so that congenital cardiac syphilis can be diagnosed only by a thorough microscopic examination of the heart wall.

G. R. PISEK.

KENDALL, ARTHUR I.: BACILLARY DYSENTERY: ITS BACTERIOLOGY, BIOCHEMISTRY AND THEIR RELATION TO TREATMENT. (*Boston Medical and Surgical Journal*, March 2, 1911, p. 288.) (From the Department of Preventive Medicine and Hygiene, Harvard Medical School and the Boston Floating Hospital.)

Kendall's studies on bacillary dysentery showed that what was clinically infectious diarrhea was not always due to the same agent. The Shiga and the Flexner bacillus were absent in 10 to 15 per cent. of the babies. These cases with negative findings always had the gas bacillus (*Bact. Welchii*) in the stools and responded quickly to sour milk therapy. The writer considers them the causative agent of the so-called fermental diarrhea. He draws attention to the protein-sparing action of sugar when a mixture of the two is inoculated with dysentery bacilli, which will utilize carbohydrates in preference to proteins. The putrefaction

products of the action of bacteria are the harmful toxic bodies, while the results of fermentation of carbohydrates are not harmful. Bearing this in mind, the babies were treated accordingly after an initial dose of castor oil; 5 per cent. solution of lactose in sterile water was given until the acute symptoms abated or it became apparent that the patient required some nitrogenous food. Nitrogenous food must be fed cautiously. This feeding of lactose is intended to accomplish a twofold purpose—to furnish to the host a readily assimilable food, requiring a minimum expenditure of energy to metabolize it, and to change the character of the metabolism of the dysenteric flora from the proteolytic to the fermentative type. This change of type is particularly desirable to prevent further intoxication of the host and to give him a better chance to combat the poisons already absorbed. It is apparent that lactose or any carbohydrate cannot be fed for too long an interval without harmful effects. The whole article should be read to appreciate its importance and full significance.

Fritz B. Talbot.

PHYSIOLOGY.

TUNNICLIFF, R.: OBSERVATIONS ON THE ANTI-INFECTIOUS POWER OF THE BLOOD OF INFANTS. (*Journal of Infectious Diseases*, October 25, 1910, p. 698.)

As the result of a study of the blood of healthy infants the author comes to the following conclusions: The opsonic power of the blood serum as well as the phagocytic activity of the leukocytes of infants toward streptococci, pneumococci and staphylococci follows a definite cycle. At birth both are a little less active than in adults, but this activity diminishes considerably during the first months of life, and does not reach that of adults until about the second or third year. From this it would seem that during the first and second years of life the anti-infectious power of the infant's blood is far below that of adult blood.

ALFRED F. HESS.

HYGIENE.

BROWN, GEORGE V. I.: THE EFFECT OF MAXILLARY READJUSTMENT UPON THE DEVELOPMENT OF NASAL CHAMBERS AND FACE. (*Annals of Otology, Rhinology and Laryngology*, December, 1910, p. 885.)

The proper and normal development of the alveolar arch can

only take place when there is no interference with growth of the teeth. The first effect of pressure from crowding takes place along the line of least resistance, which is in the direction of the nares and results in restricting their size, either on one or both sides. The second effect is the overlapping of the tooth crowns. One of the most potent influences upon jaw development is the physiological action of correct respiration. The proportionately large tongue in cases with restricted jaws interferes greatly with the child's learning to talk. It matters not whether enlarged tonsils and adenoids are the cause of compressed jaws or whether they are the result of nasal irregularities in growth, their removal is the first corrective measure.

The author advocates his appliance for rapid separation of the maxillæ so that a widening of the nares and correction of intranasal defects may result. The slow methods cause gradual movement of the teeth and bone absorption in the alveolar processes, but this does not effect nasal deformities as does a more rapid separation and less movement of the teeth but a general outward movement of the whole alveolar process. His appliance consists, roughly described, of a jack-screw so arranged that it presses against a bar which is fastened to all the molar and one bicuspid tooth on each side of the upper jaw. The nut is turned twice daily until a firm pressure is felt. No pain should be complained of. The maxillæ are thus separated through their median suture; the amount of separation is shown by the space between the incisor teeth.

This treatment has effected in growing children a marked physical improvement; increase in height and weight and better mental condition as shown in their school life. One very noticeable effect is the great relief from nervousness. There is better breathing, and many nasal deformities are corrected by this means; nasal drainage is improved and secretions cease to collect. The author thinks it is a great factor in safeguarding against tuberculosis, as well as many other diseases of the respiratory tract.

S. W. THURBER.

BLACK, NELSON M.: WIDENING THE DENTAL ARCHES IN NASAL STENOSIS; ITS RESULTS AND POSSIBILITIES. (*Annals of Otology, Rhinology and Laryngology*, December, 1910, p. 933.)

The author has divided his article into a consideration of the subject under several heads: (a) septal deflections. Four objects to be obtained, viz., free nasal breathing, restoration of septum

to the median line, equalization of the size of the nares and as little injury as possible. All this can better be accomplished by widening the arch of the superior maxilla than in any other way. The jaw may be widened at any age, as the suture persists until middle life. There is actual increase in width of nose, the volume of air causes the static congestion in the turbinates to disappear, so that a proposed removal of portions of these bodies should be deferred until they have become readjusted to the new conditions and may not have to be touched at all. Constricted nares, without obstructive lesions, are markedly benefited by widening the maxillary arch. S. W. THURBER.

THERAPEUTICS.

ROHMER, PAUL: "TUBERCULIN THERAPY IN EARLY CHILDHOOD" (*Archiv. für Kinderhk.*, Vol. LV., Parts 1 and 2, p. 51.)

The detailed reports of 6 cases treated with large doses of tuberculin according to the method of Engel and Bauer are given. While the method was readily carried out, it was found that with the continued administration of increasingly large doses a condition of tuberculin anaphylaxis set in. One case of tuberculosis in an infant was uninfluenced by the treatment. Scrofulous symptoms in children two to four years of age were clinically markedly improved, while anatomically well-marked symptoms of repair could be demonstrated. In 1 case of osseous tuberculosis, and in another of very severe tuberculosis following measles, the spread of the disease was in no way influenced by the treatment. The author advises the use of moderate doses only up to 0.1 c.c. S. FELDSTEIN.

BACTERIOLOGY.

KENDALL, A. I., AND WALKER, A. W.: THE ASSOCIATED FLORA OF BACILLARY DYSENTERY. (*Boston Medical and Surgical Journal*, March 2, 1911, p. 294.)

The writers divide the pictures into three groups:—

Group I., "obligate dysenteric flora," includes *B. dysenteriae*, *B. coli* and the streptococcus, with liquefying bacteria culturally similar to *B. cloacae* and others in smaller numbers. These organisms represent a typical putrefactive flora growing in the intestinal secretions in the absence of carbohydrate.

Group II., the antithesis of Group I., consists in obligate

fermentative bacteria *B. bifidis* and *B. acidophilus* in addition to a certain number of facultative organisms which have become fermentative in their metabolism instead of putrefactive. Prominent among these is the *B. coli*. *Streptococcus* and *B. dysenteriae* have disappeared under the carbohydrate regime.

FRTZ B. TALBOT.

MISCELLANEOUS.

LAWRENCE, CHARLES H.: A METHOD OF COLLECTING URINE FROM FEMALE INFANTS. (*Boston Medical and Surgical Journal*, March 2, 1911, p. 309.)

The apparatus is prepared in the following manner: In the strip of adhesive tape there is cut a hole a little larger than the vulval orifice of the infant from whom the specimen is to be obtained. The end of the strap which is to be applied posteriorly is split into two tails, the cut being carried close to the hole. A rubber glove thumb is dropped, tip first, through the hole in the strap, the adhesive side of which is held uppermost. That part of the rubber thumb which remains above the hole is turned down on to the adhesive surface of the strap and pressed firmly against it, care being taken to have the rubber flange narrow enough so that there will be a band of adhesive surface around it. The tip of the thumb is cut off, a test tube inserted and the joint made tight by wrapping it with adhesive tape.

To apply the apparatus, the strap is placed over the perineum so that the opening in it lies over the vulva, the anterior end extends up on to the lower abdomen, while the posterior tails are directed backward and outward over the buttocks, avoiding the anus. Gentle rubbing causes the strap to lie smoothly and prevent leakage.

When the strap is in place the vulval orifice is covered by the open end of a rubber funnel through which the urine drains into the receiving vessel. If a single specimen is desired, the heavy test tube may be allowed to rest between the baby's legs, the upper end being slightly raised. For twenty-four hours amount the rubber piping is led to the bottle on the floor as the tubing in constant drainage of the bladder in adults. Removing of the apparatus is not painful, the strap peeling off easily. The adhesive tape must of course be changed each time the apparatus is used; the glove finger should serve for several cases.

FRTZ B. TALBOT.

ARCHIVES OF PEDIATRICS

AUGUST, 1911.

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

OPEN-AIR WARDS AND WEAK CHILDREN.

Ever since it was found in the treatment of tuberculosis that fresh air brought with it healing and renewed vigor, the idea of its use in other diseases has gained ground and the principle has found application to many other ailments and in many different ways. Always the tendency has been toward a more complete placing of the patient outdoors. Wall after wall of the sick room has been removed until he is now placed quite in the open, often without even a windbreak. This idea in modern hospital work began with that courageous man who opened wide his windows, bid defiance to draughts and shut off his heating apparatus. Results followed immediately, but not the results which the conservative elements had prophesied, no "catching cold," no pneumonias, no awful complications were noted. Instead, quieter nights, better rest, ruddier cheeks, brighter eyes, a stronger pulse, and a less elevated temperature, these did result. Sedatives be-

came almost unnecessary and convalescence was accelerated. Pneumonia was perhaps the first disease to have a fair trial of fresh air. Perhaps because of its being a respiratory affection with dyspnea more air was deemed advisable, although it was well known to physiologists that even twice-breathed air has more oxygen than the blood can take up. But the treatment did good along the lines indicated above, of improving the general condition rather than in relieving air hunger. So the treatment was applied to other ailments, and now our diarrheal diseases of summer are treated with fresh air, which means open air.

The rationale of the open-air method is not immediately apparent. It is not a surplus of oxygen; canned oxygen to saturation stimulates but does not give such general improvement; it is not merely fresh air, for air indoors, though frequently renewed, does not suffice; it is not the coolness of the air, for outdoor wards in summer work about as well; it is not moving air, for fans in a closed room bring none of the brightness to the eye and color to the cheek which comes when a patient is placed out in "fresh, cool, flowing, outdoor air," as we are now continually doing. The best explanation of the efficacy of the treatment is advanced in the work of Howland and Hoobler, already printed in the pages of the ARCHIVES. They found that by removal to the open air the blood pressure was materially raised and the rise was more permanent than that obtained by the usual stimulants. These investigations are not yet entirely completed, but they suggest the manner in which the good is wrought.

In our treatment of summer diarrhea we now make use of open-air wards, open sheds, and even tents with much benefit. The brick and stone houses in this hot summer time absorb heat all day long and ooze heat throughout the night, so that under all circumstances the temperature is elevated beyond that of the moving air outside. It has been found that heated dwellings favor the occurrence of diarrheal disease by the effect of the heat on the human organism as well as by causing the spoiling of food. It is a common phenomenon to see a child whose previous history has been one of vomiting, diarrhea and dysentery in its hot tenement home have fewer stools, rest quietly and present an entirely different picture from its dreadful condition at home when once it gets into the hospital.

However, there is a class of children for whom the outdoor living may not be good, but may be harmful and dangerous. These are the little babies under one year of age who, being on the verge of marasmus, have had a digestive upset. These children are always under weight, look frail and thin, with a transparency about their hands and feet that is ominous. They need not have assumed the "little old man look" of beginning marasmus either to be put into this class. Any child markedly under weight or not yet ten months old should be excluded from an open-air hospital, unless special provision can be made for individual care and warming. The "fresh, cool, flowing air" carries away too much heat from such little babies, and unless the digestion is adequate, which it rarely is, to the assimilation of a high caloric content in the foods, they have a constantly subnormal temperature, look blue and pinched and old, grow thinner and thinner, and some day when the sudden early morning chill comes a little colder than usual they die. It can be predicted almost infallibly that such children will not survive. It is the equivalent of a death sentence to place them in the most ideal open-air ward where the walls are guiltless of windows and the air is constantly moving. For the larger children this is a blessing, but these weaker little ones need warmers and windows; their body heat must be conserved so that the vital processes can proceed. In the sunny part of the day wide open windows and free circulation of air are good, but later in the day and at night windows must be lowered and warm wraps used. Blankets are needed beneath as well as above the children, and hot-water bottles or electric heaters are necessary adjuncts. Nearly as much care must be taken with these children as with incubator babies.

An ideal ward for such children would be equipped with screened windows opening on three sides of the room right down to the floor, with basket cribs having a heating—but not a burning—apparatus for night, perhaps best in the form of Northrup's "baby warmer," and an allotment of attendants of one to every three babies.

One probably seldom will achieve the ideal in this as in so many other things, but we hope that until such is attained the babies of this delicate class may be excluded from our outdoor hospitals,

ORIGINAL COMMUNICATIONS.

THE DIETETIC MANAGEMENT OF DISORDERS OF GASTRIC DIGESTION IN INFANTS.*

BY ALFRED HAND, JR., M.D.,
of Philadelphia.

It may not be amiss at the start to digress briefly from the subject for a few introductory remarks on the physiology of gastric digestion. I must first express dissent from those who say that the stomach has a relatively unimportant part in the processes of digestion, being merely a convenient reservoir to pass the food on intermittently into the small intestine, and that if it were only convenient to eat small amounts all the time we could really get along without the stomach at all. That may be so from the standpoint of chemical investigations, but clinically, if we have the stomach with us in any given case of marasmus, the prognosis is vastly better than when the stomach is against us.

The normal gastric juice of infants is said to contain hydrochloric acid and three ferments, lipase, rennet and pepsin. Slight disturbances of health are often sufficient to diminish or suppress the hydrochloric acid, especially the presence of mucus; hyperchlorhydria may, however, occur in infants as well as in adults. The total acidity is increased by the action of the ferment lipase, splitting the fats into fatty acids, and, if there is motor insufficiency, symptoms of fat-indigestion are apt to arise. Pepsin in the stomach of young infants has very little time to do much work; the milk must be curdled, the curd must swell through the action of hydrochloric acid, and the pepsin must then dissolve it from the outside and convert it into albumoses, propeptones and peptones, a process which requires considerable time for its completion. The infant's stomach should normally be empty in an hour and a half after feeding, so there is the temptation to say

* Read before the Philadelphia Pediatric Society, April 11, 1911.

that gastric peptonization is comparatively unimportant. But it is very probable that even this incomplete digestion renders the pancreatic digestion in the small intestine all the more complete.

The important ferment of the infant's gastric juice is undoubtedly rennet, and it is by interfering with, or guiding, the action of this ferment that much is accomplished for good or ill in our attempts to nourish infants on the bottle.

Cautley has an illuminating paragraph on the proteids of milk, which I quote:—

“The proteins are caseinogen and albumin. The terminology of proteins varies with different writers. The caseinogen of Halliburton is the same as the casein of the German writers and the free casein of Van Slyke and Hart, *i.e.*, it is equivalent to calcium casein or bicaseinate of calcium, for it is always combined with calcium. The casein of Halliburton is the same as the paracasein of the Germans.

“Caseinogenate of calcium or basic calcium casein is formed by adding lime water to milk; caseinogenate of K or Na by adding alkalies of K or Na; basic calcium casein, plus antacid, by adding bicarbonate of soda; sodium casein by adding citrate of soda; and calcium lactate in buttermilk. None of these compounds is coagulable by rennet. Calcium casein forms with rennet in a faintly acid medium calcium paracasein or curd. If milk is rendered alkaline it will not curdle, but the addition of a small amount of alkali only delays clotting until it is neutralized.”

So when we add lime water we either delay or prevent the curdling of milk in the stomach, according to the amount added. Rotch has shown that if one part of lime water is added to sixteen of ordinary milk a day old, the degree of alkalinity is about that of human milk; the curdling of such a mixture ought then to go on normally if the gastric juice is of normal acidity. So when we wish to prevent all curd formation in the stomach we have the choice of using a large amount of lime water, one-eighth to one-fourth, or of the bicarbonates of soda or potash, or sodium citrate or buttermilk. To this list may be added peptonization.

The diagnosis of disturbances of gastric digestion in infants is not difficult, but in the early months of life a condition sometimes occurs which might easily be considered solely a digestive disturbance, the organic condition of hypertrophic stenosis of the pylorus being overlooked. The vomiting in each condition may

be alike, projectile, persistent and uncontrollable; emaciation may be marked, but the one, only, has characteristic visible gastric peristalsis and a palpable mass.

A brief capitulation of the cause of gastric disturbance will be of advantage, for when the cause is once determined the appropriate measures are clear. Inherited feebleness of digestion dependent on congenital syphilis or parental indigestion or debility, serves only to complicate the problem without giving clear indications for dietetic measures. The causes connected with the diet are many. Dirty milk, too rich mixtures, mixtures too strong in proteid, too weak mixtures, insoluble carbohydrates, too large bulk of feeding, too short or too long intervals of feeding, the use of "comforters" are among the most important.

Dirty milk causes gastritis, with enteritis, often fatal; if the attack is survived the digestive powers may be so enfeebled as to make the problem of nourishment most difficult. A mixture too rich in fat is liable to set up a catarrhal gastritis through fatty acid fermentation, and this usually happens; but occasionally, if the mixture is much too rich, say above 5 per cent., nature or the child avoids this trouble by taking in only a small portion of each feeding, and regurgitating the fat it cannot digest; constipation and a failure to gain in weight are associated symptoms in this class of cases. When the mixture ranges between 4 and 5 per cent., and the full amount is taken, then fermentation, gastric and intestinal, is apt to occur, with vomiting from one-half to two hours after feeding of sour-smelling "water-brash" or curds; diarrhea is also the rule, the stools being lumpy and watery, usually yellow, some of the lumps containing casein curds, others being pure butter fat. These patients furnish a good proportion of the so-called "difficult feeding cases," for the stomach has vomited so much that it is very easily provoked, and great care has to be exercised not to overtax its powers. For some time it may be necessary to give a fat percentage much below that ordinarily desired. When a mixture too rich in fat is given, it usually happens that the proteid is also too high, so that the gastric disturbance is of a mixed type, large, hard curds being vomited, or great colic occurring soon after feeding, that is, about twenty to thirty minutes. If the proteid element is the one mainly or wholly at fault, and if the pernicious feeding has not been persisted in so long as to impair the general nutrition, the trouble

may be easily remedied by thorough evacuation of the alimentary tract by castor oil and rhubarb, followed by complete rest of the digestive organs for twelve to twenty-four hours, except so much work as would be required to handle barley water or rice water or plain water. When milk feeding is resumed, upon the choice of the proper percentages depends the future progress of the patient, whether easy or hard. Too dilute mixtures may impair the general nutrition and enfeeble the digestive organs; too strong mixtures will cause a recurrence of the trouble. Set rules cannot guide us in such cases other than the one important rule to study each patient individually.

Of the greatest help is it to know approximately what we are giving, and I know of no system so valuable as the percentage method, checked off from time to time by the calorimetric method.

I would not presume before such a gathering as this to attempt to suggest formulas, but I am sure that you will agree with me when I say that it is better to learn how to use a few tools well than to have a bewildering collection of them without a clear idea of just which one to take up.

In my own practice I find that I usually got better results with mixtures of milk, 16 per cent. cream, barley water, granulated sugar and lime water than with any other plan, so modifying that the fat never exceeds 4 per cent., usually 3.5 to 3.8 per cent., rarely giving as low a proteid percentage as 1 (usually starting at 1.5 or 1.8, according to age, and increasing it as rapidly as possible, using for the carbohydrates cane sugar and barley water, made from pearl barley, to total 6 per cent. I am sometimes compelled to use peptonization, which I never like to do for more than one or two months, classing this with low proteids and the measures mentioned earlier, which interfere with gastric digestion (great alkalinity, sodium citrate, whey, buttermilk) as having the great fault of not developing the digestive powers of the stomach. However, at times these other measures are valuable, and I have sometimes found it necessary to give whey for a time, or buttermilk (and of the two, I prefer the latter made of skimmed milk and fermented with the compressed tablets of the Bulgarian bacillus). These give the digestive organs considerable rest, and at the same time introduce enough nourishment to sustain life for a little while. They may be immediately or gradually supplanted by other mixtures; by adding cream to the whey, or fermenting the whole milk, or the feedings may be alternated.

THE DIAGNOSTIC VALUE OF GASTRIC ANALYSIS IN THE DIGESTIVE DISTURBANCES OF INFANCY.*

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Since Epstein,¹ in the year 1880, first showed the ease with which a stomach tube may be passed on even a very young infant, and Raudnitz,² in 1887, adopted this method for studying the gastric physiology of infancy, a number of observers, mostly in Germany, have made use of the stomach tube to elucidate various obscure problems relating to the gastric digestion of infants. Though the results have been varied and often contradictory and frequently were based upon such small series of cases that but little value could be placed upon them, a number of important facts concerning the infant's stomach have been learned by this method.

As the complete literature upon the physiology of the gastric digestion of infants prior to 1909 was reviewed in my article published in that year,³ I will confine myself to-night to pointing out only the salient facts of importance as bearing upon the diagnosis and treatment of the digestive disturbance of infancy.

As the child as a whole is but a miniature of the man, so the physiologic activities of the infant's stomach are but those of the adult in miniature. In other words, all of the functions of the adult stomach appear in the infant, but in a diminished degree. Hydrochloric acid, pepsin and rennin may all be found in the stomach of the newborn infant, but much less concentrated than in the grown man. In the newborn child, if fed on woman's milk, the stomach empties itself in from one to one and a half hours. As the child grows older this time becomes prolonged, while cow's milk and the various artificial foods have a similar influence.

The secretion of hydrochloric acid is slight at birth and increases with the child's age. Immediately after a meal the acidity is the same as that of the food, but it steadily increases during the progress of digestion. Owing to the great affinity of hydrochloric acid for casein, an attraction so great that according to Heubner⁴ 100 c.c. of cow's milk will take up and absorb .324

* Read by invitation before the Philadelphia Pediatric Society, April 11, 1911.

grams of hydrochloric acid, a percentage of acid in excess of that ordinarily found in the stomach, free hydrochloric acid cannot, in healthy infants, be demonstrated during the early stages of digestion, and when the child is on a milk diet it can rarely be found until from an hour and a half to two hours after the meal.

The presence of free hydrochloric acid in the infant's stomach is considered to mean that enough acid has been secreted to supersaturate the casein, and that more than enough is present to insure complete peptic proteolysis. It is the acid which has combined with the milk which acts with the pepsin in splitting the protein molecule, and that only; the acid appearing in a free state is a superfluous excess. Pepsin is secreted from birth, and even during intrauterine life, and is always, during health and disease, in relative excess of the acid. In my experience in no single case did the addition of acid fail to increase the proteolytic power of the gastric contents. In considering the gastric digestion of infants, therefore, pepsin may be disregarded, and it may be taken for granted that lack of digestive power is not due to lack of pepsin. Rennin also appears to be present in sufficient quantity both in health and disease.

The early investigations were largely carried on from the viewpoint of pure physiology rather than that of clinical pediatrics, and little or no effort was made to correlate the results with the practical feeding of infants. In the year 1907, however, on the recommendation of Dr. L. Emmett Holt, I was appointed to the staff of the Rockefeller Institute for Medical Research and undertook a long series of investigations into a twofold problem—the exact action of such “milk modifiers” as lime water, barley water and sodium citrate on gastric secretion and digestion, and the value of a test meal and gastric analysis in the diagnosis and treatment of the digestive disturbances of infancy. Since the appearance of the report on this work in 1909⁵ there have been published a number of articles by American and foreign observers working along the same line, whether stimulated by my work or not I am unable to say. The problem which I have set myself for to-night is the study and analysis of the results of these various investigations and the comparison of them with my own findings in the effort to learn the truth as to the value of gastric analysis in the diagnosis of the digestive disturbances of infancy.

Various disturbing factors have made this task far from an

easy one. In the first place, there has been but little attempt at uniformity of method; no two observers have made use of the same test meal nor have the meals been left in the stomach for a uniform time. The test meals used have included milk, sugar solutions, tea, barley water, woman's milk, cow's milk in various modifications, malt soup, and even zwieback, and the times which they have been allowed to remain in the stomach have varied from ten minutes to four hours.

In my own work, I used milk and water in the proportion of 1 to 1, 1 to 2, and 1 to 3, barley water, 5 per cent. lactose solution, and all of these variously modified. I concluded that the most satisfactory test meals were milk sugar and water, allowed to remain thirty minutes, to study simple gastric juice, and milk and water in the proportion of 1 to 2, examined one hour after the meal, to study the effect of a normal food upon secretion.

Sherman⁶ used, in one series, barley water and, in another, a starchy proprietary food containing milk. Heiman,⁷ in a series of newborn infants, used woman's milk and, in older children, "artificial food." Through a printer's error Heiman's tables were omitted from this article, but he has kindly sent them to me for study. I found that his "test meal" varied from "soy bean" through milk and barley water, malt soup and zwieback. Such varied methods are, of course, incapable of comparison, and I have, therefore, with these tables and that of the other authors quoted, taken the liberty to reanalyze the cases, using only those in which milk and water, or milk and barley water, were used and the food remained in the stomach one hour. Wentworth⁸ has used modified milk mixtures approximating woman's milk in percentage. In one paper the meal was removed after one and a quarter hours, and in the other after times varying from three-quarters to two hours. Tint and Breskman,⁹ of Philadelphia, in their report, state that "the gastric contents were obtained at a period varying from one to two and half hours after feeding." As, however, the authors do not specify in their tables the time in the individual cases, their figures were not available for analysis. Aurnhammer¹⁰ used tea as a test meal, and Cowie and Lyon¹¹ various milk mixtures at varying periods.

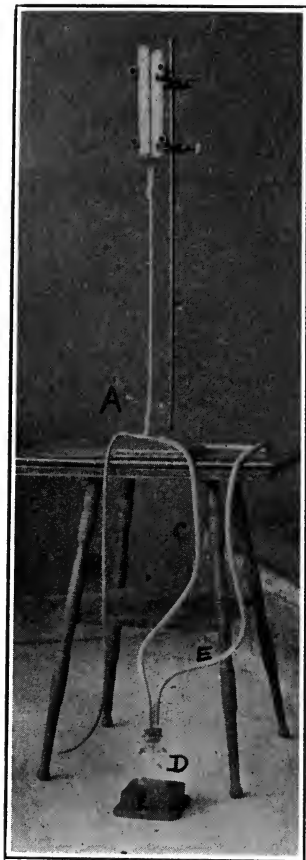
It will readily be seen that comparison of results obtained by such widely varying procedures are unjustifiable. I have, therefore, wherever possible, reanalyzed the various authors' statistics by a study of their tables, making new averages by using

only the figures obtained from experiments with woman's milk or cow's milk feedings, which have been removed after one hour from the time of ingestion, or from barley water, tea or milk-sugar solutions after thirty minutes. As it has been found by practically all observers that when, late in digestion or associated with excessive motility, but a few c.c. of food remain in the stomach, the acidity is disproportionally high, I have also taken the liberty of eliminating all figures obtained when less than 15 c.c. could be removed from the stomach. Allowing for such corrections the average results of analysis of the gastric contents of the healthy infant as found by the various observers are shown in the accompanying table:—

Investigator	Test Meal	Time in Stomach, Hours	Total Acidity	Combined Chlorides		Free Hydrochloric Acid	
			c.c.n/10 NaOH per 100 c.c.	c.c.n/10 NaOH per 100 c.c.	Gm. HCl per 100 c.c.	c.c.n/10 NaOH per 100 c.c.	Gm. HC per 100 c.c.
Heiman	Woman's milk	1	21.2	....	....	0	0
"	Cow's milk	1	28	....	....	0	0
Cowie and Lyon	Cow's milk	1	28	16	.058	0	0
Clarke	Woman's milk	1	26.5	14	.051	0	0
"	Cow's milk and water $\frac{1}{2}$	1	23	11	.040	0	0
"	Cow's milk, 1 Water, $\frac{1}{2}$	1	23.5	19	.069	0	0
"	Cow's milk, 1 Water, $\frac{1}{3}$	1	20.5	18	.066	0	0
Wentworth	Cow's milk	1	....	16	.058	0	0
Sherman	Barley water	$\frac{1}{2}$	9	5.6	.020	2.1	.008
Clarke	Barley water	$\frac{1}{2}$	9.5	5.5	.020	3.7	.013
Aurnhammer	Tea	$\frac{1}{2}$	7.5	....	....	....	....
Clarke	Sugar and water	$\frac{1}{2}$	6.5	....	....	4.5	.016

A study of this table will show that the total acidity in the normal infant's stomach one hour after a milk feeding averages from 20 to 28, or about one-half that found in the adult, while free hydrochloric acid is normally absent and combined chlorides vary from 11 to 19 (.040 to .069 per cent.). One half hour after barley water the average total acidity is about 9, and the free hydrochloric acid from 2 to 4 (.007 to .014), while the same length of time after tea or sugar solution the total acidity is a trace lower and the free hydrochloric acid a shade higher.

These figures, I believe, may safely be taken as representing the average normal gastric contents of the infant, and may be used for comparison in studying the various digestive disturbances of this period of life. These figures represent averages only and are subject to wide individual variations in infants to all appearances in normal health.



AUTHOR'S APPARATUS FOR
REMOVAL OF STOMACH
CONTENTS OF INFANTS.

A few words are necessary as to technique and methods. You are all familiar with the ease with which a small catheter may be passed into the infant's stomach when lavage or gavage is desired. For the removal of a test meal, owing to the large size of the curds, a somewhat larger tube is required. It is surprising, however, to find how very small an infant can easily be made to swallow even so large a tube as a 22 or 23 French rectal tube, provided the pharynx is passed during the deep inspiration following an outcry. Some authors have even gone so far as to state that the tube could be passed and the meal removed without disturbing the infant's slumbers. The apparatus which I devised to facilitate speed and accuracy in removing the test meal is shown in the accompanying cut.

This consists of a graduated glass reservoir holding 500 c.c. of water, attached by a clamp to an iron upright, so that it stands about two feet above the table. From the outlet, two to three feet of soft rubber tubing leads to a T-tube of large caliber. Just above the T-tube is a pinch cock (A). Over one arm of the T-tube is drawn the stomach tube, a soft rectal tube, either 22 or 23 French (B). From the second arm of the T-tube runs a stiff tubing (C) to a bottle on the floor (D). The bottle fits into a wooden stand to keep it in an upright position, and is supplied with a tightly fitting rubber stopper, through which protrude two glass tubes. The tubing (C) from the T-tube fits tightly over one, while from the second extends about four feet of similar stiff tubing (E). This last is held in the mouth of the operator and is used to apply gentle suction when for any reason the stomach contents do not siphon quickly. The bottle is detachable and is used as a specimen bottle.

As a large proportion of the hydrochloric acid of the contents is in chemical combination with the casein curds, unfiltered gastric contents must always be used for analysis. The total acidity and free hydrochloric acid when present are estimated by the usual titration with $N/10$ sodium hydrate, using phenolphthalein and dimethylamidazo-benzol as indicators. The estimation of the organically combined chlorides is of especial importance in the study of infant digestion, as practically the entire hydrochloric acid secretion of the stomach is found in this form. Sherman titrated against alizarin to obtain this. Wentworth, and Cowie and Lyon used the Sjöquist method, and in my own work a modification of Volhard's method was applied. These methods are described elsewhere, and time does not permit of their repetition here.*

Besides these investigations of the stomach contents of the normal infant studies have been carried on in ill infants of three main types—marantic infants, chronic vomiting babies and pylorospasm cases. Various authors have shown that in cases of simple marasmus there is marked reduction in the hydrochloric acid secretion into the stomach but very little change in the amount of pepsin or rennin. Whether this hypoacidity is the cause of the atrophic condition of the infant is doubtful, as it has been shown in a number of instances that even after complete recovery from the clinical symptoms the acidity has remained decidedly below normal.

In 1907 Miller and Wilcox, of London,¹² called attention to a class of ill infants which they entitled "acid dyspepsia," in which, on examination of the gastric contents, a decided hyperacidity was found. In my series of vomiting infants there seemed to

* The modification of Volhard's method used by the author was as follows: Two portions of unfiltered stomach contents (A and B), 5 c.c. each, were placed in platinum or porcelain dishes. One specimen (A) was made slightly alkaline with NaOH to convert all free and organically combined HCl into NaCl. The specimens were evaporated over the water bath to dryness and gently carbonized over the free flame. The ash was carefully washed into evaporating dishes, and the chlorides estimated in each specimen. During the incineration all free and organically combined chlorides of B were driven off and only the inorganic chlorides remained. The chloride content of A, in which all chlorides were retained in the form of NaCl, was considered to represent the total chlorides, and that in B the fixed or inorganic chlorides. The total chlorides, less the sum of the free HCl and the fixed chlorides, represented the organically combined chlorides. The estimation was made as follows:—

The specimen was acidified with HNO_3 ; then 5 c.c. of $N/10$ $AgNO_3$ was added to precipitate the Cl as $AgCl$. The excess of $AgNO_3$ was titrated with $N/10$ KSCN, using iron-ammoniumalum as an indicator. Subtracting the amount of KSCN used from the amount of $AgNO_3$ added gave the amount of $AgNO_3$ required to convert the Cl of the specimen into $AgCl$. The following equation gave the amount of HCl in the specimen: (c.c. of $AgNO_3$ — c.c. of KSCN) \times .00365 \times 20 = per cent. of HCl in the specimen.

be a fairly definite division into two classes—those with an acidity markedly above normal, and another with a low acidity. I therefore grouped them as “hyperacidity” and “hypoacidity” vomiting cases. The hyperacidity cases on sugar or barley water diet showed, one-half hour after ingestion, a total acidity averaging from 10 to 12 and free hydrochloric acid from 6 to 9 (.022 to .033 per cent.). Sherman found in similar cases a total acidity averaging 15 and free hydrochloric acid of 4 (.015 per cent.). In other cases Sherman found a low acidity.

The most striking changes in the gastric contents, however, occur in certain cases of hypertrophic pyloric stenosis or pylorospasm. As early as 1900 Knöpfelmacher¹³ reported a case clinically of pylorospasm, in which two hours after a milk meal the total acidity varied from 75 to 90, the combined hydrochloric acid from 55 to 75 (.200 to .273 per cent.) and free acid from 25 to 55 (.091 to .200 per cent.). Miller and Wilcox found hyperacidity in some of their pylorospasm cases and a hypoacidity in others. Feer,¹⁴ in 11 cases studied, found in 7 of them total acidities varying from 50 to 105 and free hydrochloric acid from 0 to 50 (0—.182 per cent.). Similar results have been obtained by other observers. (Ramsey,¹⁵ Bernheim-Karrer,¹⁶ Engel,¹⁷ Freund,¹⁸ Miller,¹⁹ Clarke.⁵)

Such are the chief facts concerning the finding of the various observers who have studied the chemical constituents of the gastric contents of healthy and ill infants by means of test feedings. Whether the application of these facts will ever be a practical aid in the diagnosis and treatment of infantile digestive disturbances the future must determine. In cases of marasmus as yet nothing of great practical value seems to have been learned.

In the chronic vomiting cases a test meal will easily determine to which class of cases, hypoacidity or hyperacidity, the particular infant belongs, and may give valuable information as to the proper mode of treatment.

Possibly the most useful function of the test meal will be in the early diagnosis of cases of pylorospasm. I do not intend to enter the lists in the conflict between those who consider this disease to be a hypertrophic stenosis, due to a congenital malformation, or a muscular hypertrophy secondary to a pylorospasm as the result of gastric irritation. Both theories have many facts in their favor. If the latter theory is the correct one and the pylorospasm is in even a small proportion of the cases, due to a hyper-

acidity, the presence of such an abnormality should be ascertained at the earliest possible moment. Even if it should be proven that the hyperacidity is the result and not the cause of the pylorospasm, and its correction of no therapeutic value, its recognition may be of great importance in the early diagnosis of this most dangerous and intractable disease.

The study of the gastric contents has also taught us a number of facts of therapeutic as well as diagnostic value. Especially has information been afforded as to certain rational procedures for the reduction of hyperacidity. The vast majority of physicians would probably advise the addition of lime water to the food to reduce the acidity of the stomach. This, I am confident, will not bring about the result desired, for I found in my investigations that the addition of lime water, though it neutralized a portion of the acid, stimulated the gastric glands to such an increased secretion that at the end of the hour as much and often more available hydrochloric acid was found in the stomach than when the alkali was not used. Sodium citrate on the other hand seems to destroy the hydrochloric acid without stimulating the glands to an appreciable extent. When this was added to a test meal free hydrochloric acid was practically never found and the organically combined chlorides were reduced to a minimum, while the inorganic chlorides were proportionally increased.

Cowie and Munson,²⁰ Moore and Ferguson,²¹ and others have shown that the administration of oil or fats by mouth reduced the gastric acidity. The most interesting method from the viewpoint of physiology has grown out of the experiments of Benczur,²² who showed in dogs that the administration of saline solutions per rectum inhibited acid secretion into the stomach. Since this observation two German writers, Rosenstern²³ and Rosenhaupt²⁴ have treated series of cases of congenital pyloric stenosis by means of continuous saline injection with most gratifying results clinically.

In conclusion I wish to state that I believe a suitable test meal properly used may prove in time to be an aid of very considerable value in the treatment of certain of the digestive disturbances of infancy. Before its actual worth is proven, however, a large amount of investigation and practical application of the results on ill children will be necessary. The individual variations in the infant are far greater than in the adult and the correct interpretation of the results is therefore proportionately more

difficult. The most important features in the investigation which are to come must be uniformity—uniformity in method, uniformity in the test meal, uniformity in time, and uniformity in the method of analysis. The test meal, as applied to the newborn child, is in itself in its infancy. If it is to become a useful member of the medical curriculum, it must be nurtured carefully and developed systematically, that it may in time prove a boon in the hour of pediatric dietetic doubt.

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THE SURGERY OF THE INFANT STOMACH.*

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The surgery of the infant stomach, when practically considered, offers rather a narrow field. This is due to several factors, of which the age, under two years, is the most important. Its influence appears in the diminished liability of the infant to many diseases and injuries, and in the difficulty of eliciting signs and symptoms of those that do occur.

For these reasons, gunshot and stab wounds of the stomach, perforating ulcers of the stomach and duodenum, etc., can be dismissed with a word.

Foreign bodies in the infant stomach are not infrequent. The diagnosis depends on the history and the X-ray examination. Symptoms are rare, as any object which passes the esophageal narrowings and reaches the stomach usually gives no symptoms. The same factor ordinarily determines the easy passage of the object. Coins, buttons, pins, etc., small objects picked up by the child, are the usual material. The shape, consistency and bulk are the qualities to be considered in treatment, in their order of importance. If sure to pass, the palliative or Vienna treatment is to be adopted. Mashed potato, bread, etc., are administered to form a bulky coating and avoid injury in downward passage. Gastrostomy for foreign body is seldom required in the infant, on account of the small size of the object usually swallowed. Its indications are: (a) for quiescent body clearly not to be passed; (b) for symptoms from any variety; (c) for impaction in the lower esophagus.

Congenital obstruction of the esophagus is very rare. The upper end of the lower segment usually opens into the trachea, and even if gastrostomy is performed, the patient suffocates from regurgitation of food and secretions.

Cicatricial contraction of the esophagus occasionally demands operation of the stomach. Here again the condition is relatively infrequent under two years. The injury is due to drinking corrosive fluids, e.g., lye, and is generally seen in older children. In

* Read before the Philadelphia Pediatric Society, April, 1911.

treatment, bougies are first tried. Here the use of swallowed string for a guide, as suggested by Mixter and recently developed by Plummer, might help even at this age. This failing, gastrotomy is done and treatment continued by bougies from below, sawing with a string passed through, or by introducing gradually increasing sizes of rubber tubing. Feeding through the gastrotomy opening aids treatment by putting the stricture at rest.

Gastric and duodenal ulcers are rare and probably due to the toxemias of infancy, including burns. It is interesting to note that perforation has been found at autopsy as early as forty-five hours, two months and one year of life.

So far as I know, the diagnosis during life has never been made in infancy. The effect of age in obscuring the localizing signs and symptoms is evident here.

Infantile stenosis of the pylorus may be of two types (1) Hypertrophic stenosis, and (2) pyloric spasm or stenosis with and without tumor. The nomenclature is varied and depends a good deal on the view taken of the *etiology*. (a) Congenital. Cautley* believes that there is a primary pyloric thickening—a true congenital deformity. Against this is the fact that symptoms are rare under a week, and that the lesion has been shown to be a true hypertrophy. (b) Hypertrophic. At operation and autopsy, the condition has proved to be actual increase of muscle fiber, chiefly the circular. As against neoplasm, this overgrowth extends considerably into the pyloric antrum. (c) Spasmodic, due to fissure and hyperacidity.

Unless the condition is divided into the two forms, hypertrophic and spasmodic, the best theory is that the muscle increase is hypertrophy due to persistent spasm from various kinds of irritants.

Symptoms.—The subject is usually a breast-fed boy baby. Vomiting, constipation, loss of weight, tumor and visible peristalsis are the important symptoms. Vomiting begins at seven to ten days to one month. At first regurgitant, it later becomes cumulative and projectile. There is hyperacidity, with absence of bile. The degree of constipation varies with the amount of food passing through the pylorus. In the extreme cases, the stools are few, small, and contain practically no fecal material. Visible peristalsis may be noted, ending in the tumor when the latter is

* Cautley, "Diseases of Infants and Children," London, 1910.

present. Later, gastric dilatation and even tetany may be found. Greater use of X-ray examination after a bismuth test meal will doubtless be made in future.

Prognosis is good in the mild grades, poor in the severe without operation. Meltzer says that all who survive more than four months unoperated had a slight degree of stenosis. Scudder* believes the prognosis is bad in pyloric tumor without surgery.

Treatment.—Medical treatment is always to be tried first and thoroughly. Undoubtedly this will be curative for many of the milder cases. But persistent loss of weight is the test and this must not be allowed long. Particularly in cases with tumor should operation be considered early.

Quoting Scudder† again, "If the diagnosis can be made of a pyloric tumor causing obstruction, the earlier operation is performed the safer will it be for the baby concerned." I would make a plea for the inclusion of these patients in the class of border-line cases where the surgeon is called early and given a chance to follow the progress of medical treatment with the physician. He can then better estimate the child's vitality and resistance, secure a more favorable time for operation, and also learn a lesson by seeing cases recover under medical treatment, whereas now he sees only the late cases where operation is a last resort.

Surgical treatment consists in some form of pyloroplasty or in gastrojejunostomy. Of the former, Nicholl's operation seems the best. While theoretically pyloroplasty seems superior, as leaving the stomach more nearly in its normal condition, gastrojejunostomy is coming to be the operation of choice. While my personal experience is limited to one case of pyloroplasty, the difficulty in dealing with the thickened pyloric ring would incline me to gastrojejunostomy hereafter, certainly in cases with tumor.

The statistics of the two operations have changed relatively very much in the last few years. Deaver and Ashhurst‡ give a table in which the mortality of gastrojejunostomy in 69 cases is 53.60 per cent., while Nicholl's operation in 13 cases gave only 15.38 per cent. Scudder§ gives 14 gastrojejunostomies, all living and well from two months to five years after operation. In 6

* Scudder C. L., *Surgery, Gynecology and Obstetrics*, 1910, Vol. XI., p. 275.

† Scudder, C. L., *Ibid.*

‡ Deaver and Ashhurst, *Surgery of the Upper Abdomen*, Philadelphia, Vol. I, p. 142.

§ Scudder. C. L., *loc cit.*

of these patients, the X-ray examination shows the stomata still functioning at one and a quarter to five years after operation. That is, the pyloric tumor is still obstructing. He mentions one successful operation where the patient died of another cause seven and a half months later. At autopsy, the tumor was found obstructing and the stoma working. The microscope showed true muscle hypertrophy.

Scudder's* metabolic experiments are also interesting. He found that digestion, as estimated by fat and proteid metabolism, is practically normal after gastrojejunostomy.

When to these facts we add that all this series, 14, are in perfect health several years after operation, are thriving and have gained in weight and height, the supposed distorting and crippling effect of gastrojejunostomy on the digestive tract is not in evidence. These observations indicate that, as in gastric ulcer in the adult, when there is actual obstruction from pyloric tumor, gastrojejunostomy is the operation of choice. In the absence of pyloric tumor, Nicholl's pyloroplasty undoubtedly has a field, though here too the experience and individual preference of the operator may incline him to gastrojejunostomy.

SERUM TREATMENT OF HEMORRHAGIC DISEASE OF THE NEW-BORN.—E. B. Bigelow (*Journal of American Medical Association*, 1910, Vol. LV., p. 400) records 3 cases, 2 of them apparently moribund, successfully treated by injection of 5 c.c. of rabbit serum immediately after it was obtained from the animal. The most impressive fact in each case was the almost immediate control of the hemorrhage after the administration of the serum. This was shown directly from observation of the umbilicus in the first case, and the nose in the third, while indirectly in all 3 by the absence or marked diminution of normal blood in the stools, although for the following two or three days each baby did have a tar-like material in the stool, suggestive of old blood; but no tests were made at the time to prove this.

In the first case this dose was repeated in twelve hours, although there was no sign of a fresh hemorrhage at that time, and it seems to have been uncalled for. The serum in these cases gave absolutely no untoward symptoms.—*American Journal of Obstetrics*.

* Scudder, C. L., *loc cit*.

PYLORIC STENOSIS IN INFANCY. AN UNUSUAL SOURCE OF ERROR IN DIAGNOSIS.*

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Philadelphia.

While constructive attempts to furnish aid in the diagnosis of disease are more acceptable than the converse, yet the latter have distinct conservative value.

In the diagnosis of pyloric stenosis two physical signs are of paramount importance, namely, visible peristalsis and palpable pyloric "tumor." As an example of a most unusual source of error in the interpretation of visible peristalsis the following case is of interest.

M. D. M., female, aged three months and two days, was seen on October 2, 1909, in consultation with Dr. Ingham, to whom I am indebted for the clinical notes of the case.

Both parents suffered from "indigestion," but were otherwise healthy. Neither presented any neurotic symptoms. The patient was the only child, conceived in the first year after marriage. The family history was negative. The pregnancy had been marked by excessive vomiting during the first five months, but there had been no other marked signs of toxemia. Parturition on July 4, 1908, had been normal and the infant weighed 9 pounds 6 ounces at birth. The maternal milk supply appeared on the third day, but was never abundant. The puerperium was normal. During the second week, owing to the breasts becoming "caked," a skimmed milk mixture (S. 4 P. 1.25) was used in alternation with the breast milk. After ten days, breast feeding was resumed. (July 29th.)

The baby suffered from the time of birth with "gastric indigestion," evidenced by more or less vomiting. On July 22d, the weight was 8 pounds 8 ounces, and vomiting occurred after most of the feedings. On August 1st she was taken to the country for five weeks. The report during that time showed the same frequency of vomiting—the food being principally breast milk. Regurgitation would occur from a few minutes to one or two

* Read before the John Morgan Society, March, 1910.

hours after nursing. The bowels were persistently constipated, but the stools appeared normal.

On September 9th she was returned to Dr. Ingham's care. His notes at this date were as follows:

"The nutrition is greatly impaired—weight (with clothes), 8 pounds 4 ounces. Vomiting occurs after every feeding, usually in from one to one and a half hours, sometimes in a projectile manner, apparently emptying the stomach; at other times the vomitus consists of only a few drams. There is no sour odor to the vomitus. The bowels move only with laxatives but movements are normal in appearance and of considerable bulk. An analysis of the breast milk (Holt's method) showed a specific gravity of 1.029—fat 3.3 per cent.—which gives presumptive evidence of a low or nearly normal proteid."

The treatment consisted of bismuth subnit, grain i, calomel, grain $\frac{1}{40}$, cerium oxalate, grain $\frac{1}{2}$, q.i.d. One or two ounces of thin, well-cooked and strained barley water, containing ten drops of essence of pepsin, were administered before each breast feeding.

On September 16th, the weight was 8 pounds 9 ounces, while the vomiting was less and the general condition improved. On the next day the mother left the child for the afternoon with a nurse with instructions for barley water feedings. To this the nurse added an unknown quantity of sugar. The next day there was an increase of the vomiting and an attack of diarrhea. From this time the case progressed unfavorably, in spite of several changes in the diet. On October 2d, when seen in consultation, she was almost *in extremis*. The weight appeared to be about $5\frac{1}{2}$ to 6 pounds. The abdomen was scaphoid with some prominence of the epigastrium, across which, from left to right, a slow wave of peristalsis was distinctly seen. The pylorus could not be palpated. The diet in the twenty-four hours preceding death consisted of breast milk, barley water and "liquid peptonoids."

A diagnosis of probable incomplete hypertrophic stenosis of the pylorus with spasm was made on the following points:—

- I. Normal baby, breast-fed on a rather weak milk.
- II. Vomiting almost from birth, practically continuous, at times projectile.
- III. Progressive atrophy, with the exception of one week.
- IV. Almost continuous constipation.

V. Visible gastric peristalsis.

That the stenosis was incomplete could be inferred from the fact that improvement was noted at times, that some food was retained and that the bulk of the stool was relatively large.

Death occurring on October 3d, an autopsy was fortunately permitted, four hours after death. The notes are as follows:

The thoracic cavity and organs appear normal. The abdomen is distended. The stomach can be seen only in the small triangle under the ensiform, presenting an area about 2 cm. in breadth by 6.7 mm. in height. Occupying practically the entire epigastric region are two distended portions of the colon lying directly transverse to the long axis of the body. The upper of the two portions is the transverse colon proper, the lower one is formed by the descending colon, which turns abruptly to the right at the splenic flexure, crosses immediately under the transverse colon to the hepatic flexure and then proceeds diagonally down and to the left to pass into the pelvis at a point to the left of the promontory of the sacrum. The stomach is slightly dilated (estimated) and almost completely overlaid by the colon as described. The stomach contents consist of white, starch-like mucus. The corrugations of the mucosa are well marked, but there are no gross signs of increase in the thickness of the muscularis, either in the vestibule or at the pylorus. The latter easily admits a good sized probe. There is a slight constriction of the duodenum by the root of the mesentery, but not enough to prevent the free passage of air and chyle. The contents of the bowel are normal in amount and appearance. Neither the walls of the colon and small intestine nor the abdominal viscera show any gross changes.

Seven c.c. of the starch-like mucus recovered from the stomach were diluted with an equal quantity of distilled water, ground in a mortar and filtered. The amount of filtrate being so small, only a few tests were possible.

Free HCl was not detected by either Congo paper or the resorcin test. In a mixture of 2 c.c. of filtrate with 14 c.c. $\frac{1}{20}$ HCl. solution, egg albumin (Mett tube) showed only a slight "clarification"—after forty-eight hours in the incubator. The presence of starch could not be demonstrated with Lugol's solution.

Albumin was proved to be present with the Biuret test. Microscopically the sediment showed excess of mucus (soluble in

acetic acid), no fat droplets. Squamous epithelium and leukocytes were present in moderate number, also coccal and diplococcal forms of bacteria and granular detritus.

The microscopic examination of the tissues removed at autopsy was made by Dr. Clifford W. Farr, to whom I am indebted for the report.

"Sections from the thymus, pancreas, liver, spleen, pylorus and small intestine, stained with hemotoxylon and eosin, show no change from normal. The circular and longitudinal muscularis of the pylorus appear to be of normal thickness. There is entire absence of round-cell infiltration or of connective tissue formation between the muscle fibres. The liver shows moderate fatty infiltration but not to a degree greater than is seen in most cases of atrophy and starvation."

The noteworthy point about the case was the position of the descending colon. It occupied the lower portion of the epigastric space and lay entirely above the umbilicus, so that the normal wave of peristalsis was seen in the usual site of the gastric movements. While it is not extremely uncommon for the descending colon to take an oblique downward course to the right, with the result that the sigmoid flexure lies at or to the right of the median line, yet the transverse position in this case must have been a most unusual one.

The exact diagnosis of such cases of gastric intolerance is, at times, difficult. To justify operative interference, it would seem that at least two of the three most important symptoms of pyloric stenosis should be present—persistent minimal bulk of the stool, palpable pyloric tumor and visible peristalsis.

In addition we possess a most valuable aid to diagnosis in the X-ray picture after a bismuth feeding. Under favorable conditions skiagraphy will serve as the deciding factor, as is exemplified in Scudder's recent paper, "Surgery, Gynecology and Obstetrics," September, 1910.

Granting that a diagnosis of true hypertrophic stenosis is not fully warranted, upon what depends the symptom, vomiting, which, if unrelieved, will surely result fatally, as in the case recorded?

That a frequent cause of vomiting—excess of fat—was absent in this case cannot be absolutely inferred from the result of one analysis of the mother's milk. We know, however, that there

are many instances where a low or normal percentage of fat in mothers' milk—established by repeated analyses, coexists with vomiting. In such cases we may fall back upon the unsatisfactory term, "fat intolerance."

Until we know more of fat-splitting as it occurs in the stomach, we can hardly be satisfied with such evasion. A priori, we would expect to find the products of fatty acid fermentation in the gastric contents. Lactic acid, however, is rarely demonstrable—although the odor of butyric acid is, of course, often detected in the vomitus. In the recorded case, as in many others, the vomitus was free from rancid odor.

Mechanical irritation from large or tough curds, produced by too rapid curdling by rennet, is, likewise, not a factor in many cases so far as the vomitus or gastric washings may inform us. Hyperacidity from excessive secretion of hydrochloric acid—appearing both as free acid and as acid in combination with proteid—has been demonstrated in some cases of hypertrophic pyloric stenosis, but its absence is equally well proved in others as well as in non-stenotic cases. Alteration of the diet, diminishing the amount of food, lengthening the interval between feedings, abolishing night-feedings, together with medication and lavage, frequently lead to the re-establishment of healthy gastric digestion—but in a certain proportion of cases the fatal vomiting is only temporarily relieved.

So far as present methods of recovering and examining the gastric contents teach, we are unable to determine any satisfactory basis upon which to rest a diagnosis in these cases.

Either our methods of determining chemical or physiologico-chemical alterations of the gastric juice are defective or the solution of the problem is to be sought elsewhere.

In view of the more recent advances in the study of gastric motility and of our changed conception of the importance of the motor and pyloric functions, it seems possible that disorders or defects of these most important parts of the gastric phase of digestion may account for the otherwise unexplained symptoms in cases of gastric intolerance.

In this way the theory of pylorospasm, apart from permanent stenosis, has been invoked.

If by this term we may understand a failure of pyloric opening at proper intervals as well as actual spasmodic closure, it

would seem to be a distinctly valuable addition to our conception of the difficulties with which the stomach has to deal.

Without lengthy consideration of the theory, one practical point in its favor may be mentioned.

In these cases of gastric intolerance, the vomitus appears at varying periods after feeding, usually from one-half to two or even three hours.

Lavage done three or four hours after feeding usually brings away food remnants. Delayed motility is therefore to be clearly inferred.

The cause of delayed motility may be sought in weak peristaltic function, or in obstruction at the pylorus. That the muscular coats of the stomach are not devoid of tonus may be inferred from the act of vomiting itself. The main factor in the upward propulsion of food must be the contraction of the gastric muscularis, since frequent and repeated vomiting takes place with little aid from the abdominal muscles—the force of gastric contraction evidently being sufficient. That such force, applied in the right direction, could propel the food downward, provided that pyloric relaxation were normal, seems to be a reasonable inference.

In cases of gastric intolerance, therefore, in which true pyloric stenosis can be excluded and in which careful investigation of the strength of food and condition of gastric secretion, with regulation of the diet and proper treatment, especially by lavage—fails to disclose a sufficient cause or to bring relief, the explanation of the phenomena may be found in a perversion of the motor mechanism, especially that of the pylorus.

To the solution of the problem of pyloric control we may confidently look for aid in our conception and treatment of at least some of these cases. That pyloric control may in turn depend upon hitherto undiscovered or unappreciated changes or defects in gastric secretion does not alter the importance of the pyloric function.

The theory of the acid control of the pylorus offers tempting opportunities for further conjecture.

According to this theory the presence of acid in the distal end of the pyloric canal causes the pylorus to relax, whereupon chyme is ejected into the duodenum. The presence of acid upon the duodenal side of the pylorus acts in an opposite manner, causing

pyloric contraction. As the chyme in the duodenum becomes neutralized the duodenal stimulus to contraction is lessened, to be finally overcome by the increasing acid stimulus in the pyloric canal.

The well-known delay in the appearance of free hydrochloric acid or its entire absence, in the stomach contents of infants—the presence of hyperchlorhydria in cases of pyloric stenosis, in which the acid on the duodenal side is supposed to stimulate pyloric contraction—the probability that fatty acids in excess, imperfectly neutralized in the duodenum, exert the same action upon pyloric closure—may lead us far in the field of speculation.

That we need more than theory in the elucidation of the problem of gastric intolerance, however, is only too apparent.

Finally, it may be noted that the most stubborn cases of vomiting offer the greatest difficulty in differential diagnosis. If the results of surgical interference, in the form of gastroenterostomy, justify that operation for true stenosis, it follows that a certain proportion of cases of gastric intolerance or “functional” stenosis will, undoubtedly, receive the same mechanical relief.

Available evidence goes to show that food leaves the stomach through the artificial stoma after a gastroenterostomy only when the pyloric orifice is closed, or, to put it in another way, that food leaves the stomach by preference through the pylorus rather than through an artificial opening.

If relief of functional stenosis follows a gastroenterostomy, we could not be certain, except from the evidence of X-rays, how long the food continues to leave by the artificial route; but if the relief proves to be permanent, we would have most important proof of the agency of the pylorus in the causation of the symptom, vomiting.

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SOME EYE TROUBLES OF EARLY LIFE.—John Waite Avery (*Medical Record*, January 15, 1910, p. 101) briefly discusses the refractive and muscular disturbances of the eye from infancy to youth, and he points out the significance of various symptoms. These conditions may give no special trouble, or even become apparent, until the strain on accommodation begins when the child starts school. Headaches are a common symptom of eye-strain.—*British Journal of Children's Diseases.*

NURSING STATISTICS DERIVED FROM THE STUDY OF THE INFANCY OF 1,500 CHILDREN, AND A CONTRIBUTION TO THE CAUSE OF THE SUMMER INFANT MORTALITY.*

BY HERMAN SCHWARZ, M.D.,

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The opportunity to study the infancy of 1,500 children was given me by means of a pediatric department, which I established in connection with the obstetrical clinic of Dr. I. L. Hill. The plans and results of the first year's work were reported in the *Journal of the American Medical Association*, Vol. LIV., page 1,307, and in the annual report of the institution. At present the work may be divided into prenatal and postnatal stages. The prenatal portion is in the hands of Dr. Hill and his assistants, and consists of general medical and gynecological care of the woman. It is our endeavor to have the women apply to the clinic as early in their pregnancy as possible and put them into the best possible medical and mental condition. The latter is done by providing for their means of livelihood and in giving general aid. For assistance in this we have to thank the many excellent charities in New York City.

The postnatal work begins at birth. A pediatric nurse sees the child a few hours after birth, bathes it, prepares the cord in the ordinary manner, and visits the child daily until it is taking the breast well, or knows the reason why it is not taking the breast. The importance of seeing the child from birth in reference to our influence on breast feeding is very well illustrated by a report of Dr. Gerstenberger's, who had made some arrangement by which the obstetrical clinics in Cleveland sent him the babies. Of 171 babies seen by nurses for the first time, with ages ranging from birth to three months, the percentage on the breast had decreased to 76. The main object of this work as a preventive of infant mortality was to encourage breast feeding. The nurses were instilled with the propaganda of breast feeding. Everything known to the science of maternal nursing was tried before the child was allowed the bottle.

We should not be satisfied with the idea that maternal lactation is a disappearing function, as expressed in a recent paper on the conservation of child life. As far as we in America are concerned, we do not know whether or not it is a disappearing

* Read at the First Annual Meeting of the American Association for Study and Prevention of Infant Mortality.

function, and the more I am beginning to know about it the more I feel that this is not so. The work of this clinic, then, has a twofold object: First, the propaganda of breast feeding, including the education of mothers, physicians and nurses, and, secondly, the gathering of statistical knowledge which might bear some relation to infant mortality.

In the following tables I will present a few statistics on breast feeding which I have compiled by following each child until it has become a bottle baby.

TABLE I.
RESULTS IN BREAST FEEDING, 1908-1910.

No. of Infants.	Time observed. Months.	On breast only.	Percentage on breast only.	Mixed feeding.	On bottle only.	Percentage on bottle only.
1,501	1 mo. or less...	1,454...	96.9	11	36	2.4
1,406	2 "	1,286...	91.3	46	74	5.
1,258	3 "	1,109...	88.1	56	93	7.2
1,148	4 "	979...	85.2	64	105	9.1
1,040	5 "	856...	82.3	76	108	10.4
928	6 "	718...	77.3	89	121	13.
823	7 "	615...	74.7	90	118	13.
732	8 "	520...	71.1	90	122	16.6
665	9 "	458...	70.3	82	125	18.6
587	10 "	398...	67.8	81	108	18.6
503	11 "	329...	63.	67	107	21.3
462	12 "	296...	64.	72	94	20.4

This shows that 96 per cent. of our babies were able to take the breast for one month or less, that 88 per cent. were on the breast for three months and 77 per cent. for six months. This table also gives an idea of the kind of follow-up work which is possible, for we have been able, for instance, to observe the same 928 babies for six months and at the end of our second year report upon 462 babies which we have followed for one year. Of thirty-six women who could not nurse at all, six had inverted nipples, or 3-10 per cent. of the entire number of women under observation; eleven had tuberculosis, who might have nursed if they had been permitted to; four had to work; one was insane, and six were in the hospital for various surgical reasons. So of 1,500 women we have to report six who could not nurse on account of inverted nipples and four who seemed to have no milk at all. All the others were capable of nursing a few weeks to many

months, as will be seen from Table I. This proves very conclusively that if care is taken from the very start most women can do something toward nursing their children.

Inasmuch as there are a number of foreign women included in this series I refer you to Table II., showing the results of the observations of 221 American-born women.

TABLE II.

BREAST FEEDING IN AMERICAN-BORN WOMEN.

No. of infants.	Time observed. Months.	On breast.	Percentage.
222	1	214	96.4
210	2	192	91.4
182	3	151	83.0
162	4	124	76.0
156	5	113	72.4
141	6	89	63.5
128	7	82	64.0
115	8	73	63.6
101	9	64	63.0
97	10	59	60.0
84	11	51	60.0
72	12	41	57.0

TABLE III.

COMPARISON OF BREAST FEEDING RESULTS IN AMERICAN AND FOREIGN-BORN MOTHERS.

Breast feeding. Months.	American mothers. Percentage.	Foreign mothers. Percentage.
1	96.4	96.9
2	91.4	91.3
3	83.	88.1
4	76.	85.
5	72.	82.
6	63.	77.
7	64.	74.7
8	63.	71.1
9	63.	70.3
10	60.	67.
11	60.	63.
12	57.	64.

From Table III. you will see that there is some difference in the length of time in which foreign mothers nursed their children as compared with the American-born.

In order to show what influence such a clinic as ours might bear upon the nursing propaganda, I have prepared Tables IV. and V., which show the results in 173 women of all nationalities and thirty-four of American parentage.

TABLE IV.

ABSOLUTE NURSING BEFORE AND AFTER CLINIC RULE.

Of 44 women who nursed a previous child	0 months.			
10 " " "	8 " " "	under	clinic	supervision.
9 " " "	6 " " "	"	"	"
5 " " "	5 " " "	"	"	"
4 " " "	4 " " "	"	"	"
9 " " "	3 " " "	"	"	"
4 " " "	2 " " "	"	"	"
3 " " "	1 " " "	"	"	"

Of 23 women who nursed a previous child	1 month.			
2 " " "	8 months	under	clinic	supervision.
3 " " "	7 " " "	"	"	"
4 " " "	6 " " "	"	"	"
5 " " "	5 " " "	"	"	"
3 " " "	4 " " "	"	"	"
2 " " "	3 " " "	"	"	"
4 " " "	2 " " "	"	"	"

Of 26 women who nursed a previous child	2 months.			
3 " " "	9 " " "	under	clinic	supervision.
2 " " "	8 " " "	"	"	"
8 " " "	7 " " "	"	"	"
4 " " "	6 " " "	"	"	"
3 " " "	5 " " "	"	"	"
3 " " "	4 " " "	"	"	"
3 " " "	3 " " "	"	"	"

Of 40 women who nursed a previous child	3 months.			
2 " " "	9 " " "	under	clinic	supervision.
2 " " "	8 " " "	"	"	"
9 " " "	7 " " "	"	"	"
7 " " "	6 " " "	"	"	"
30 women who stopped at 2 months could be induced to continue from 6 to 9 months.				
4 " " "	5 months	under	clinic	supervision.
7 " " "	4 " " "	"	"	"
9 " " "	2 and 3 " " "	"	"	"

Of 22 women who nursed a previous child	4 months.			
4 " " "	8 " " "	under	clinic	supervision.
7 " " "	7 " " "	"	"	"
2 " " "	6 " " "	"	"	"
3 " " "	5 " " "	"	"	"
5 " " "	4 " " "	"	"	"
1 " " "	3 " " "	"	"	"

TABLE V.

RESULTS OF BREAST FEEDING IN AMERICAN MOTHERS UNDER
CLINIC RULE.

Of 10 women who nursed a previous child 0 months.

1	"	"	2	"	under	clinic	supervision.
2	"	"	3	"	"	"	"
1	"	"	4	"	"	"	"
1	"	"	5	"	"	"	"
1	"	"	10	"	"	"	"
4	"	"	12	"	"	"	"

Of 10 women who nursed a previous child 1 month.

2	"	"	2	months	under	clinic	supervision.
1	"	"	3	"	"	"	"
1	"	"	4	"	"	"	"
2	"	"	5	"	"	"	"
2	"	"	6	"	"	"	"
1	"	"	8	"	"	"	"
1	"	"	12	"	"	"	"

Of 6 women who nursed a previous child 2 months.

1	"	"	3	"	under	clinic	supervision.
1	"	"	4	"	"	"	"
1	"	"	6	"	"	"	"
1	"	"	8	"	"	"	"
2	"	"	12	"	"	"	"

Of 2 women who nursed a previous child 5 months.

1	"	"	8	"	under	clinic	supervision.
1	"	"	10	"	"	"	"

Of 6 women who nursed a previous child 3 months.

3	"	"	4	"	under	clinic	supervision.
2	"	"	6	"	"	"	"
1	"	"	7	"	"	"	"

As will be seen in the above tables 207 women have been induced to nurse a child for a longer period while under the supervision of the clinic than they did a previous child. This excellent result has one very obvious criticism, which I take upon myself to make—that some of these previous children were the first born and, therefore, the second born might often nurse for a longer period than the former.

I need hardly go into the importance of breast feeding as a factor in the conservation of infant life. Yet I should like to refer to Langstein's statistics for Berlin during the year 1906,* which show the great difference in the mortality of infants fed on woman's milk and those on animal's milk.

* Festschrift zur Eröffnung des Kaiserin Auguste Victoria-Hauses Zur Bekämpfung der Säuglingsterblichkeit im Deutschen Reiche.

INFANT MORTALITY FOR BERLIN IN 1906 (LANGSTEIN).

In	Mothers' milk.	Animals' milk.	Other food.	Food not given.	Total.
January	85	317	97	161	662
February	49	238	91	164	639
March	65	259	80	170	566
April	51	257	136	193	637
May	66	344	111	182	703
June	47	325	138	210	721
July	56	528	204	234	1,032
August	89	761	332	297	1,487
September	61	427	196	230	919
October	75	246	112	166	600
November	73	234	92	183	586
December	86	236	80	241	639

Furthermore, statistics published in the *American Underwriter* of December, 1909 (E. B. Phelps), show that the deaths due to diarrhea and enteritis in the registration area were 113 per 100,000 inhabitants for the years 1900-1904, and had increased to 118 per 100,000 inhabitants from 1905 to 1908; in the rural parts of this registration area, where undoubtedly breast feeding is diminishing more rapidly, this increase in mortality has been greater, going from 73 to 93 per 100,000.

Our mortality during these two years was at the rate of 75 per 1,000 born. We do not wish to compare this with New York City's mortality, for that would be erroneous, as it leaves out entirely the many illegitimate and ill-cared-for infants, whose mothers are not likely to apply to institutions such as ours for relief. Fifty-four out of the entire 117 dying died before the age of two months. Of interest as to the causes of these deaths, I should like to mention that 12 of them, more than one-tenth of the entire deaths, were due to prematurity, and for this we have recently instituted a regime by which the children are immediately taken to an institution where proper care can be taken of them.

In the course of the work we have been able to gather some social data, which you will find in the First Annual Report of our work. Inasmuch as intelligence in preparing milk mixtures and the general care of the child bears such an intimate relation to infant mortality, I wish to present to you Table VI., which shows the relation of literacy to infant mortality. Here it is seen that

where both parents could read (706 families) the infant mortality was 136.7 per 1,000 born. Where both could not read, the mortality was 190 per 1,000 born. Where either one or the other could read, the mortality did not differ greatly from that where both could read.

TABLE VI.

RELATION OF LITERACY TO INFANT MORTALITY.

	Both Literate.	Both Illiterate.	Mother not Literate.	Father not Literate.
Number of charts	706	209	315	58
Number of children . . .	2,426	710	1,190	202
Infant deaths	326	135	138	55
Infant mortality rate . .	136.7	190	116	123

The importance of the mother working during her pregnancy has often been brought before you and need not be dilated upon. In Table VII. it will be seen that of 166 women who had to work the infant mortality rate was 278 per 1,000 born, and of 535 women who did not have to work the mortality rate was 131 per 1,000 born.

TABLE VII.

INFANT MORTALITY IN RELATION TO MONEY-EARNING OF MOTHER.

	Yes.	No.
Number of charts	166	535
Number of children	459	1,953
Number of infant deaths	128	257
Infant mortality rate	278	131

The relation of infant mortality to nationality is shown in Table VIII. Of 225 American-born mothers the mortality was 210 per 1,000 born, as compared with 533 foreign mothers with a mortality of 117 per 1,000 born. This great difference is certainly not on account of their superior knowledge, but because of the fact that breast feeding is more common among them and they nurse for a longer time.

TABLE VIII.

INFANT MORTALITY IN RELATION TO NATIONALITIES.

	American mothers.	Foreign mothers.
Number of charts	225	533
Number of children born	839	2,024
Birth rate per family	3.2	3.8
Number of infant deaths	137	238
Infant mortality rate	210.9	117

The second item, which I wish to present to you in brief, is the cause of infant mortality during the summer time. As is well known, death takes place under the guise of a so-called summer diarrhea, and what the cause of this summer diarrhea is, is by no means clear. A pathologic change in the sense of inflammation, as is understood by the terms "enteritis" and "colitis," is present probably in the minority of cases, for we find so little change in the stomach and intestines at postmortem examinations. Bacteria as an etiologic factor might cause these deaths either by decomposed milk or by infection from one to the other child. The question of decomposed or bad milk is an important one and has been in the foreground for a number of years. By the term "bad milk" we usually mean one that is very acid or even sour. Yet during the past few years it has been clearly demonstrated that an acidified milk is certainly not dangerous to a great many infants. That epidemic diarrhea occurs, especially in hospital services, has been shown especially by Escherich. Proper methods of feeding, no matter what kind of milk is used, is a most important factor. In investigating this subject Park and Holt* came to the conclusion that the most important factor for securing good results is intelligent care. Leaving out the very worst store milk in the summer, the results were much less affected by the character of the milk than they had anticipated. The importance of the kind of mixtures, the amounts at each feeding and the frequency of the feeding cannot be overestimated.

Finally, the temperature of the atmosphere itself seems to be a great factor in the production of this summer mortality. In order to make this more evident I have prepared a chart by taking the daily maximum temperatures and daily mean humidity

* *Medical News*, December, 1903.

during the months of June, July and August of 1910 and comparing them with the number of children dying each day in Manhattan during these months. The chart shows very well how the temperature and mortality curves follow almost parallel lines, lower in June, going up in July and down again in August, a day of high mortality being preceded by twenty-four hours of high temperature. The humidity, on the other hand, was high in June, low in July and high in August. Wherever the temperature was high and the humidity low the death rate was high; wherever the humidity was high and the temperature high the mortality was low. In other words, hot or dry days seem to be more dangerous to the infant than hot moist ones. From the experience of Rietschel we have seen how children placed in superheated rooms soon get temperatures and intestinal symptoms. Holt in his work drew attention to great atmospheric heat and its effect upon the infant no matter what its care. It is easily conceivable, then, that an infant improperly fed upon cow's milk is always more or less alimentarily disturbed, and when a hot wave comes is directly affected by the heat and dies.

DECEPTIVE BEGINNING OF CERTAIN DISEASES WITH ABDOMINAL SYMPTOMS.—M. d'Oelstnitz (*Arch. de Méd. des Enf.*, February, 1910) says that acute infantile diseases almost always begin with abdominal symptoms, vomiting and pain. Meningeal reactions without causal lesions are constant in various affections, and may be demonstrated by lumbar puncture. These symptoms sometimes mask completely the symptoms of the primary disease, and cause a wrong diagnosis to be made. Pulmonary troubles in infants may begin with abdominal pain, often localized in the iliac fossa and simulating appendicitis. Pneumonia and pleurisy evolve quietly without any marked chest symptoms, and only a careful examination will bring out the physical signs. The author describes a case of measles in which this occurred. The abdominal symptoms were very intense, diarrhea, vomiting, meteorism and pain being present. In measles there is at the period of incubation a polynuclear hyperleukocytosis, which often triples the number of white blood cells. It is constant enough to cause a suspicion of the incidence of measles when present; during the eruptive period it distinguishes measles from similar eruptions.—*American Journal of Obstetrics.*

GRIPPE ON THE PACIFIC COAST.

BY SANFORD BLUM, A.B.M.S.M.D.,

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An epidemic of influenza occurred on the Pacific Coast of North America in the winter and spring of 1888-'89. For weeks prior to this epidemic gripe had raged throughout Europe. Thence it was carried to the Atlantic seaboard and in a short time reached San Francisco, Los Angeles, Portland and Seattle; from which foci it spread rapidly over the entire Pacific Coast. Etiologically, symptomatically and pathologically this Pacific Coast epidemic was identical with other gripe epidemics. Since 1888-'89 repeated outbreaks have occurred in this territory, but none has assumed the proportions of an epidemic. On the other hand, cases of gripe are constantly present, and a distinctive type of the disease, presenting marked deviations from the usual malady, has become endemic on the Pacific Coast.

Etiology.—Endemic gripe occurs on the Pacific Coast at all seasons of the year, but preferably in winter and spring, at which seasons it often approaches epidemic proportions. Summer, particularly in California, with its unbroken dry spell from April to October, presents few fresh cases. Atmospheric humidity is a potent factor in the causation of gripe. Many new cases occur during the first sunny days following rains, when the ground is moist and the air humid. Sex is not an etiologic factor. Age is an important element. Endemic gripe occurs at all ages, but the cases preponderate in childhood. The delicate respiratory organs of children predispose them to gripe infection. In adults, smoking, by irritating the fauces and respiratory tract, diminishes resistance to infection. The direct cause of endemic gripe is Pfeiffer's influenza bacillus. The disease is exceedingly infectious; usually some, but not all, of those exposed contract it. In families where one member has gripe most of the children sooner or later become infected, though the infection may occur at wide intervals; the adults frequently escape infection. An attack of gripe does not confer immunity; on the contrary, it predisposes to subsequent attacks. The infection takes place through the respiratory and digestive tracts. Inhaling the breath of persons suffering with gripe, or breathing the air in a room permeated with exhalations of gripe patients, as well as directly

conveying to the mouth and nose grippal discharges by means of soiled handkerchiefs, towels, tainted fingers, and especially kissing, are common modes of infection.

Pathology.—The influenza bacillus lodges on the respiratory or digestive mucous membrane, whence it spreads over the contiguous mucus surface and into the interstitial cement substance, by which path it may reach the submucous structures. Inflammation of the infected area ensues. In the nares the mucous membrane is primarily reddened, later congested. There is marked swelling of the turbinates with corresponding narrowing of the air passages. Secondly catarrhal discharge, consisting of mucus, pus and bacteria, follows. Erosions frequently occur with resultant sanguineous discharge. The superior surface of the soft palate is inflamed in nasal infections. In the throat the tonsils become congested and infiltrated. Follicular tonsillitis with cryptic deposits sometimes occurs. The oral surface of the soft palate becomes affected similarly to the nasal surface. Its inflammation is characterized by swelling and redness. The pharynx is red and infiltrated. There may be dilated blood vessels and bleeding points due to erosions, as well as patches resembling false membrane and which consist of mucus, detritus and bacteria. Pharyngeal adenoids, when present, are similarly affected. They become congested, infiltrated and eroded. From the nose the infection may extend along the lachrymal canal to the lachrymal sac and conjunctiva, causing dacryocystitis and conjunctivitis. Pronounced chemosis not infrequently ensues. From the throat the infection may traverse the Eustachian canal to the ear, causing otitis and mastoiditis. The infection may involve the antrum. In this event localized facial neuralgia, of variable severity, often ensues. When the larynx is affected there is congestion and infiltration of the mucous vestments of the laryngeal cartilages and vocal cords. The cords at first are red, swollen and rigid; later they are relaxed, sometimes eroded, and covered with discharge. Catarrhal tracheitis and bronchitis usually occur. Pneumonia is an infrequent occurrence in endemic grippe on the Pacific Coast. Pleuritis also is infrequent, but may occur. Two parts of the digestive mucous membrane are often infected, namely, the duodenal mucous membrane (with implication of Vater's tubercle) and the ileocecal mucous membrane. Toxemia is constant, but may be insignificant and is regularly less severe than is the rule in influenza. Myocarditis sometimes

occurs, but the heart is infrequently affected severely. The kidneys usually are not implicated. Rarely there is parenchymatous nephritis. Especially the anterior cervical glands may be inflamed and swollen.

Symptomatology.—The symptoms, directly deducible from the pathologic conditions, fall naturally into two groups—(1) general or systemic, and (2) local or specific. *General symptoms* are caused by the intoxication and inflammation. Nervous phenomena furnish an important group. Headache usually is present, frontal or occipital; ordinarily dull, it may have acute exacerbations, and coughing or sneezing may evoke violent paroxysms. Somnolence, mental torpor and lassitude accompany the stage of invasion and periods of fever. Somnolence is especially marked in intestinal infections involving the duodenal structures. Prostration, similar to that occurring in grippe in other localities, is exceptional. Dull pains in the limbs and back and general malaise are constant features. The muscles are sensitive to pressure; local neuritis may occur. Fever is a constant symptom. It is especially prominent in the initial stages, when it may reach 39.5° - 40° C. (103° - 104° F. Rectal). In the quiescent intervals, which characterize endemic grippe, the temperature maintains a moderate elevation— 37.5° - 38.5° C. ($99\frac{1}{2}^{\circ}$ - $101\frac{1}{2}^{\circ}$ F.).

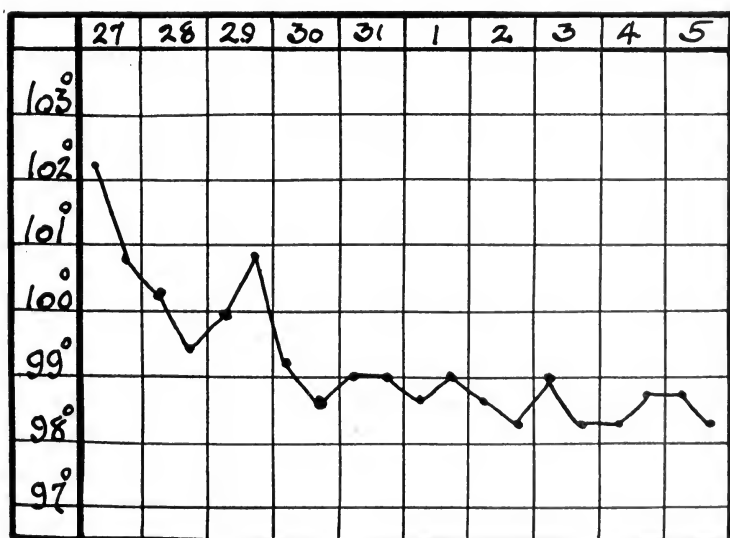


FIG. 1. TYPICAL TEMPERATURE CURVE.

Corresponding to invasion of any new considerable part, either by direct or metastatic extension of the infective process, there is a decided rise in temperature, practically a repetition of the original stage of invasion. The temperature curve is accordingly essentially irregular, of low range, with occasional exacerbations, and unsystematized remissions. Not infrequently it is higher mornings and lower evenings.

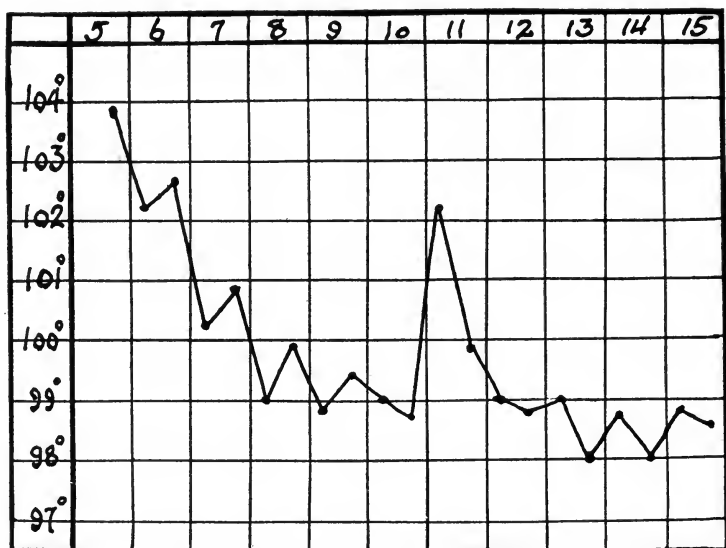


FIG. 2. GRIPPE WITH RECURRENCE.

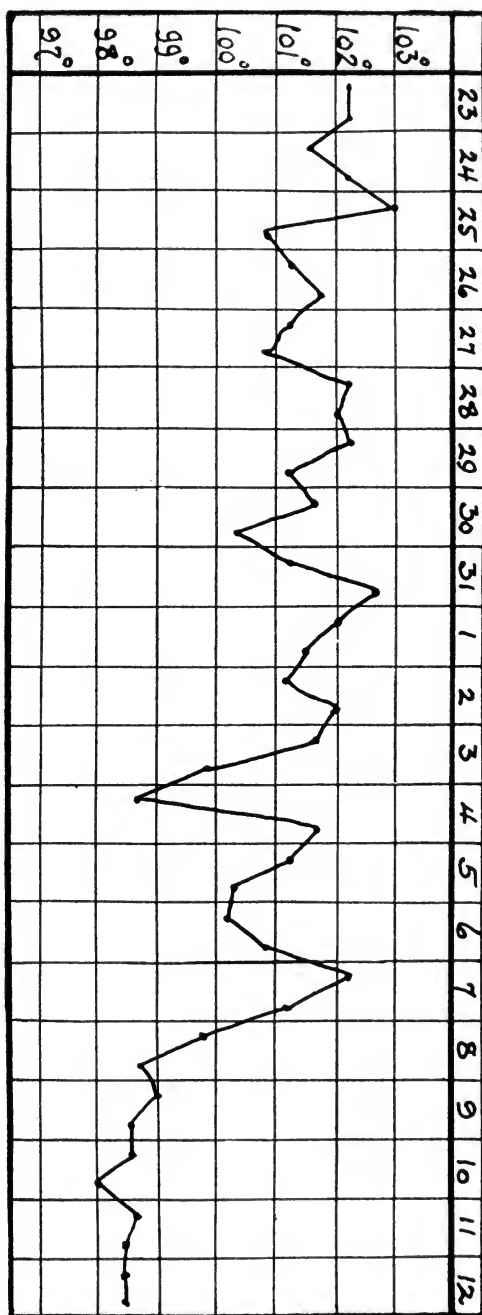
Persistently high temperatures occur in grippal otitis and mastoiditis.

Accompanying the fever the eyes are suffused and bright, the face flushed. The skin is hot and dry at times; at intervals it is covered with profuse perspiration—an effort of the system to throw off the toxins. Evaporation of this perspiration causes chilly sensations, which also occur as a toxic effect of the infection. Not infrequently, especially in children, the disease is ushered in by a distinct chill, which may recur with the local infection of each part. The digestive functions are deranged: anorexia is the rule; infants and children often vomit. The circulation is affected by the fever and toxins. The pulse rate is increased proportionately to the degree of fever and the pulse at first is full, soft and compressible. When the toxins dominate the pulse

is small, soft, irregular and compressible, reflecting cardiac depression. There may be dilatation with increase of cardiac dullness. Rarely syncope or fainting results from circulatory depression. Angina is rare, but dull aching in the cardiac region is common. In grippe jaundice the pulse may fall to 36. The urine is diminished, high colored and concentrated; it may contain albumin and granular casts. The diazo reaction is negative. The respiratory rate in uncomplicated cases is increased proportionately to the fever.

Of *special symptoms* respiratory affections afford the most important group. First of these to appear is nasopharyngitis. The stage of invasion is characterized by coryza, sneezing, lachry-

FIG. 3. GRIPPE WITH OTITIS MEDIA.



mation, tenderness of the nares and fauces; pain in these parts and mechanical hindrance to respiration (due to narrowing of the passages caused by swelling of the nasopharyngeal structures) are the initial symptoms in the prevailing type of endemic grippe. On inspection the fauces appear inflamed. The soft palate is congested; the inflamed area terminates anteriorly in a well-defined line continuous laterally with similar lines at the margin of an analogous process extending forward over the pillars of the fauces. The uvula is red and congested. The pharyngeal walls are inflamed, often traversed by dilated blood vessels, and somewhat coated by adherent mucus. Next appear evidences of catarrh; there is copious nasal discharge, first serous then mucoid, mucopurulent, often yellow and sometimes colored red by blood from erosions. By extension, or primarily, laryngitis may occur. In some endemics the larynx is primarily affected by preference. With laryngitis occurs pain in the larynx, dysphonia or aphonia, cough and expectoration. The cough is spasmodic, painful and accompanied by ejection of mucoid masses. The expectoration is copious, often has a characteristic golden color, and may be streaked with blood. It is frequently nummular, especially in the morning or after a period of quiescence, when the cough is severest and most distressing. Tracheobronchitis and bronchitis follow. Then the cough is deep-seated, paroxysmal, persistent and accompanied by copious yellowish expectoration. At first there are dry râles; later fine and coarse moist râles and crepitations are audible anteriorly and posteriorly. There may be areas of dullness corresponding to patches of bronchopneumonia (particularly in childhood), but lobar pneumonia is exceptional. Pleurisy rarely occurs. Grippal discharges from the respiratory tract contain Pfeiffer's influenza bacilli, usually mixed with staphylo- strepto- or pneumococci, but capable of identification and isolation. Gastroenteritis is usually secondary to respiratory infection. Cases occur in which this sequence cannot be traced and which may be primarily gastroenteric infections. In infancy and childhood gastroenteric involvement is the rule; it is caused by the patient swallowing the infective respiratory discharges. The specific symptoms of grippal gastroenteritis in infancy and childhood are anorexia, vomiting, colicky pains and diarrhea. There may be tenderness in the epigastrium or ileocecal region, where gurgling also may be elicited. Tympanitis is not marked. The stools are frequent, small, slimy,

light yellow to brown or greenish, foul-smelling; they may contain blood. They are expelled forcibly and often with pain. Their expulsion gives relief and frequently is followed by a fall in temperature. Not infrequently gastroenteritis is the first symptom to attract attention in infants suffering with grippe. Primary grippe of the digestive tract appears to occur more frequently in adults than in children. But this may be due to the fact that mild respiratory symptoms, which may have preceded it, have been overlooked, and that the gastroenteric infection is in reality secondary. Symptoms of grippe of the digestive tract in adults are nausea and vomiting, localized abdominal pain and tenderness, jaundice and irregularity of the bowels. Nausea and vomiting occur infrequently. Paroxysmal, colicky pains are not rare. There may be localized tenderness in the epigastrium, right hypochondrium (duodenum and liver) or right iliac fossa. There may be gurgling in the right iliac fossa. The liver may be enlarged and tender. The occurrence of jaundice is not exceptional. It may come on after a couple of days of prostration accompanied by somnolence, anorexia and fever. The temperature may reach 40° - 41° C. (104° - 105.5° F.); the tongue is coated, the bowels constipated, the pulse slow, jaundice may supervene. The jaundice is not extreme and disappears comparatively quickly (in two or three weeks). With icterus the urine is highly colored by bile and may contain albumin. The bowels are constipated; bile is absent from, or deficient in, the stools; or the bowels may be loose, the movements slimy or sticky and malodorous.

Course.—The incubation period lasts from one to three days, and is characterized by mild symptoms—anorexia, lassitude, coryza, neuralgic pains.

Invasion.—The invasion is sharp and decisive; it extends over twenty-four to forty-eight hours. During this stage there are severe local and general manifestations. There may be rhinitis, pharyngitis, tonsillitis, laryngitis, bronchitis, gastroenteritis, accompanied by fever, headache, pains in the back and limbs. Infants and children may vomit and feel chilly.

Efflorescence.—The acute local and general symptoms gradually subside and are succeeded by subacute conditions. The acute inflammation recedes and the mucous membranes relax. Synchronously the fever declines and the headache and pains lessen. This stage may be completed in about ten days, or it may be indefinitely protracted by exacerbations of the process in affected

regions or the implication of new regions. Each exacerbation or extension of the disease causes practically a repetition of the clinical phenomena from the stage of invasion onward. *Resolution* is gradual and slow. The local manifestations disappear, and with them depart fever and pain; the appetite returns, but nervous, mental and circulatory depression persist and complete recovery is protracted. The entire process requires from two to three weeks to run its course.

Abortive Form.—There is an abortive form characterized by a few days of coryza or nasopharyngitis, followed by recovery.

Complications.—Otitis media is by far the commonest complication. It usually follows nasopharyngitis and results from the infection traversing the Eustachian canal to the tympanum. Otitis may be the first or only clinical manifestation of the disease. It possesses no clinical peculiarities, but is of an obstinate type. *Mastoiditis* is a serious complication, caused by direct extension of the infection. It possesses the general characteristics of mastoiditis. *Conjunctivitis* occurs rarely; is characterized by inflammation, lachrymation and chemosis. Toxic action impairs the functional efficiency of the heart, but is rarely sufficient to cause discernible muscular degeneration or dilatation. *Broncho-pneumonia* is frequent, especially in infancy and early childhood. *Lobar pneumonia* is a rare complication. Diphtheria and endemic grippe may coexist; likewise pertussis and endemic grippe.

Diagnosis.—In this locality grippe should be suspected in every case of acute nasopharyngitis or bronchitis. Acute catarrhal affections occurring in infancy and childhood are especially likely to be grippe. All infectious catarrhal processes are likely to be grippal. Toxic manifestations—headache, pains in the back and joints, malaise, lassitude, fever—are characteristic of grippe. The combination of acute respiratory catarrh with toxic symptoms, especially during winter and spring, is usually indicative of grippe. Acute nasopharyngitis with primary rhinitis and marked swelling of the turbinates is *a priori* probably grippal. Respiratory catarrh coupled with inflammation of the fauces, the zone of inflammation being distinctly limited anteriorly by a definite line (as described above) is significant of grippe. During periods of grippe activity gastroenteric disturbances, with or without existing or antecedent respiratory affections and accompanied by headache, neuralgic pains, fever and malaise—especially in early childhood—should suggest the likelihood of grippe. Otitis

and mastoiditis of obscure origin may be grippal. The *diagnosis* of grippe can be made positively only by the identification of Pfeiffer's influenza bacillus in the discharges from the diseased parts. Pfeiffer's influenza bacillus is the indispensable factor in the etiology of grippe, though it may be accompanied by various other pathogenic organisms. Its presence gives the stamp of individuality to this large group of infections. The bacillus is found in the discharges—nasal, laryngeal, bronchial, aural, etc.—from the diseased parts. Morphologically, influenza bacilli appear as delicate straight rods, two or three times as long as they are broad, with rounded ends and noncapsulated. They are about $\frac{8}{10} \mu$ long by $\frac{3}{10} \mu$ broad. They occur singly, in pairs, chains or clusters, in the mucous discharge, in the intercellular basement substance, and in the purulent discharges from cavities—as in the pus of otitis media. They stain poorly with the ordinary anilin dyes. Satisfactory preparations may be obtained by staining smears from ten to twenty minutes with Ziel's carbol-fuchsin solution; gently heating hastens the action. The bacilli stain more intensely at the ends, which causes them to appear like diplococci. They decolorize according to the Gram method. For examination purposes smears obtained from swabs (from the throat or other mucous membrane) or from expectoration or discharges from cavities may be employed. The bacilli may occur in practically pure culture or there may be mixed infections with staphylo- strepto- or pneumococci. Cultures may be obtained by spreading infected material upon fresh blood superposed upon agar. Human, pigeon or swine's blood is available for this purpose. The colonies appear after twenty-four hours as minute, transparent, dewlike droplets. Pure cultures are obtained with difficulty.

Differential Diagnosis.—Grippe must be differentiated from simple nasopharyngitis, simple catarrhal bronchitis, tuberculosis, the early stage of measles, pertussis, typhoid fever, malaria. Grippe may be differentiated from simple nasopharyngitis and simple catarrhal bronchitis by the identification of influenza bacilli in the discharges, by the history of exposure to grippe, by the more violent onset of grippe, by the presence of toxic symptoms in grippe, by the tendency of grippe to involve other mucous membranes, by the greater obstinacy of grippe. Grippe bronchitis presents disproportionately slight physical signs compared to the amount of systemic disturbance it causes, whereas the local symp-

toms of simple catarrhal bronchitis correspond to or overshadow the systemic disturbance it produces. The differentiation of grippe from tuberculosis may be difficult. It is made by the identification of influenza bacilli and exclusion of tubercle bacilli; by the comparatively acute course of grippe as compared with the chronic course of tuberculosis; by the exclusion of tuberculosis by tuberculin tests. From measles grippe may be differentiated by a history of exposure to one or the other disease; by the different appearance of the oral and pharyngeal mucous membrane; in grippe there is diffuse redness of the pharynx and tonsils which extends onto the soft palate; in measles there are discrete spots on the soft palate and buccal mucous membranes; by the eruption of the measles on the face and chest on the fourth day; by the identification of the influenza bacillus in grippe. From pertussis grippe may be differentiated by the history of exposure; by the rapid invasion of grippe as opposed to the slow invasion of pertussis; by the preponderance of systemic disturbance in grippe as compared to pertussis; by the prominence in grippe of fever, which is inconspicuous in pertussis; by the characteristic whoop of pertussis which, however, may be present in grippe when the larynx is implicated. From typhoid fever grippe may be differentiated by the difference in the fever curve, which in grippe is essentially irregular, often higher mornings than evenings, reaches its maximum during the first days and quickly subsides; while in typhoid it is regular, higher evenings than mornings, ascends gradually, reaches its maximum in about ten days, maintains an equilibrium for a similar period and descends slowly; by the identification of influenza bacilli in grippe and by the positive Widal (and diazo) reaction in typhoid. Grippe may be differentiated from malaria by the identification of influenza bacilli in grippe and of plasmodia in malaria.

Prognosis.—The individual attack of grippe on the Pacific Coast ends in recovery. An attack of grippe predisposes to subsequent attacks and recurrences are the rule. It seems that a grippal respiratory infection persists indefinitely; the infection may be dormant indefinitely, but the constancy with which patients once attacked by grippe have recurrences indicates that the disease is not completely eradicated.

Treatment.—Quarantine; within limitations this is possible. Infants and susceptible or delicate individuals should be kept apart from persons having "colds." They should not be in the

same room with them; bringing their faces into proximity and kissing are to be avoided. A nurse suffering with grippe should not tend or sleep in the same room with an infant. The same rules apply to adults.

Hygiene.—The patients should be kept in bed throughout the stage of invasion at least, and preferably throughout the attack. Food should be bland and nourishing. In the beginning of the attack it should be limited in amount; sufficient liquid should be taken to dilute the urine and carry off effete matter. The bowels should be evacuated by a brisk purge in the beginning of the attack and kept gently open subsequently. Regulation of the atmospheric conditions is important. Even temperature should be secured by keeping the patient in one room or seeking a mild climate.

Medicinal.—No specific is known. Swabbing the throat twice daily with 2-5 per cent. silver nitrate solution, if practiced in the initial stages and if pharyngitis alone is present, may cure promptly. For catarrh of the upper respiratory tract, as far as accessible to direct application (nasopharyngitis, laryngitis, tracheitis), mild alkaline antiseptic sprays are efficient. For pain in laryngitis local applications (*e.g.*, anesthesin) may be beneficial. For bronchitis in the active stages the iodids are valuable; they seem to exercise curative as well as palliative effect. Belladonna is valuable in the moist stage. For digestive involvement, salol; for neuralgic manifestations the coal-tar preparations are efficient.

Endemic grippe on the Pacific Coast resembles the usual type of grippe in that it is an infectious disease caused by Pfeiffer's influenza bacillus, and characterized by inflammation localized especially in the respiratory tract and by pronounced systemic disturbances.

It differs from the recognized type of grippe in two respects—(1) its mildness; (2) its more widespread occurrence. Clearly defined grippe is in general a severe disease, and is accordingly regarded as serious and treated with respect and caution. On the Pacific Coast endemic grippe, because of its low fever, freedom from prostration and from immediate danger appears to be so trivial an affection that it is generally unrecognized as grippe, and, when recognized, is esteemed lightly and treated carelessly. As a result numerous cases are constantly present and widely disseminated. It is particularly common among children. Its spread is unhindered by appropriate prophylaxis. At present

it is an insidious, slow working, seemingly mild affection which, however, keeps alive and active the germ of virulent influenza. How local conditions mollify it and what conditions may instil into it new energy and virulence, careful observation may elucidate. The presence of the germ is a menace. Precision in diagnosis will reveal its identity and careful treatment may suppress it.

126 Stockton Street, San Francisco.

UNDILUTED CITRATED MILK FOR MALNUTRITION.—F. Langmead (*Proc. Royal Society of Medicine*, May 10, 1910)¹ has obtained most satisfactory results in 80 consecutive poorly nourished infants varying from three weeks to four months of age, fed with undiluted citrated milk at Paddington Green Children's Hospital. All gained weight. One died of epidemic diarrhea. Two grains of citrate or soda are added to each ounce of the undiluted milk, usually in the form of a watery solution, 1 dram of which is added to each feeding after bringing the milk to the boil. The child is weighed at first weekly and subsequently every two or three weeks and the amount of milk is adjusted according to the baby's weight and general condition and the mother's account. Citration is gradually lessened at about five months and can usually be omitted altogether at about six months, except in particularly delicate babies. One of the chief advantages of this method of feeding is its simplicity. The disadvantage of dilution, the bulkiness of the feeding, the complexity of frequent variations, the changes of artificially preserved or thickened cream, and of giving too little fat are evaded. The chief objection is the excess of proteid; but this excess is simply passed by the bowel. Constipation does not seem to be more common than with other methods of feeding. Thirst is easily relieved by water between the feedings. Citrated milk is, of course, not suitable for those rare cases which will not tolerate any milk or in epidemic diarrhea, and is not any advantage in cases of hypertrophic stenosis or other obvious organic cause of malassimilation. Acid dyspepsia as a cause of want of development calls for sodium bicarbonate in addition to the citrate.—*American Journal of Obstetrics.*

A CASE OF CONGENITAL STENOSIS OF THE ILEUM APPARENTLY OF SYPHILITIC ORIGIN.*

BY FRANK VAN DER BOGERT, M.D.,
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The case I have to report is of interest, I think, on account of its apparent etiology and from the fact that the patient showed during life a combination of symptoms which was, at least, confusing.

The baby was born November 6, 1910, at full term. The family history is as follows: The mother miscarried in her first pregnancy at three months. The second pregnancy gave a miscarriage at five and one-half months. The third, a child born at seven months lived fifteen and one-half months. The fourth, a child now living, three years and four months old and said to be cross-eyed. The fifth pregnancy brought forth the present case.

According to the previous history, the baby's bowels moved for the first three weeks two or three times daily. At three weeks constipation was first noticed, a day or two elapsing between movements. At Christmas time the baby went three days and two nights without a movement. After three weeks there was vomiting of "brown" milk, but there was no vomiting of medicines (the medicines were probably all laxatives). Before this period there was some regurgitation of the milk in its natural state. Abdominal enlargement was noted at four weeks; the child was nursed only, and the intervals between nursing were said to be regular. This history is somewhat incomplete, owing to the fact that the mother was Polish and her knowledge of English limited.

The baby was first seen at the Children's Day Nursery and Dispensary in January, 1911, constipation being the symptom which apparently alarmed the family. The abdomen was markedly distended, the abdominal wall thin, and the coils of intestine were visible on the surface. Reverse peristalsis was noted once during the examination, but never again while the child was under observation. Vomiting occurred just previous to the visit and a cloth upon which the child had vomited showed a small streak of matter of a somewhat dull golden yellow color, resembling that of an infant stool and giving a faint but characteristic odor. This was undoubtedly fecal vomitus. The bowels were constipated, but

* Specimen shown to the Schenectady County Medical Society, February 14, 1911.

a small plain water enema gave a fairly good result. There was marked emaciation.

The baby was put in the children's ward of the Ellis Hospital, where several good evacuations of the bowel were obtained through high enemata. The abdominal distention, however, con-

tinued, and the coils of the intestine were still prominently displayed on the surface.

Death occurred on January 14, 1911.

At autopsy a narrowing of the small intestine nearly, but not completely, closing the lumen of the bowel was found in the ileum 23 inches above the ileocecal valve. This partial obstruction was apparently congenital. The bowel above was markedly dilated,



FIG. 1. GUT SHOWING CONSTRICTION.

with a decided increase of the muscle tissue extending more than 2 inches above the point of obstruction. The portion of ileum below was narrow. Water poured into the bowel would slowly work its way through to the portion below. The time consumed in this procedure was not long.

The pathologic examination was made by Dr. Warren B. Stone, Pathologist of the Ellis Hospital. His report follows:—

"The stenosed portion was 5 by $3\frac{1}{2}$ by about 4 millimeters in length, and upon cross section the walls varied from $\frac{9}{10}$ to 2 millimeters in thickness. The lumen was 4 by $\frac{1}{2}$ millimeters and the stricture was very inelastic and could not be enlarged without tearing the gut.

"The thickened portion of the intestinal wall, which occupied about one-half the circumference, contained all the elements of the normal structure, but the submucosa was greatly thickened and infiltrated, with round cells. There was cloudy swelling of the mucosa.

"The thinner part of the wall which occupied the other half of the circumference contained only the submucous and muscular coats which were infiltrated with round cells and leukocytes. The mucosa had disappeared by ulceration, leaving the base covered with fibrin, necrotic cells and leukocytes."



FIG. 2. SAME DISTENDED WITH WATER.

The above pathologic findings, coupled with the history, led us to suspect its syphilitic origin.

The interesting point in the case, aside from its apparent etiology, was the occurrence of fecal vomiting with apparent ability to freely evacuate the bowels, due, of course, to the fact that the liquid bowel contents could readily, but slowly, pass through the obstruction. At times, however, compensation, so to speak, was lost and a reverse action followed. Had the child been older the abdominal distention with the prominence of intestinal coils seen on the abdominal surface would have been of far more value in establishing a diagnosis. In a wasted baby of two months, however, this symptom was of less value, since the great thinning of the wall of the abdomen and intestinal atony, with their accompanying relaxation and accumulation of gas, may, and often does, give a similar picture. Reverse peristalsis, as has been said, was noted but once. A surgeon who saw the case was doubtful as to the condition, but was of course suspicious of an obstruction. The child's condition when seen contraindicated operation.

The accompanying photographs show well the gross pathology.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, Held May 11, 1911.

WILLIAM SHANNON, M.D., CHAIRMAN.

THE BACTERIOLOGY OF MILK.

DR. WILLIAM H. PARK, Research Laboratory, Health Department of the City of New York, said that it was only within recent years that the importance of the bacterial contamination of milk had been understood. Many of the early precautions, however, which were insisted on in the care of milk supplies owed their value to keeping an excessive number of bacteria out of the milk or of preventing them from developing in it. The dangers due to bacteria in milk were also equally present in cream, and to some extent in butter. It was remarkable how persons took such great care of milk and took so little of cream and butter. In a recent small typhoid epidemic it was found that while the milk consumed by those who had contracted the disease was safeguarded raw cream was used which came from a farm upon which was a case of typhoid. It was well known that milk provided a good soil for many varieties of bacteria. While some of the saprophytic bacteria when grown in milk produced harmful products, others produced those that were harmless or even beneficial in their effects. The temperature had a great influence over the growth of these saprophytes; below 40°F. they grew slightly; at 50°F. they grew rather rapidly; at 60°F. they grew very rapidly. On the other hand, the pathogenic bacteria, with the exception of the typhoid bacilli, did not grow very well below 60°F. The diphtheria bacilli and the streptococci grew moderately well at any temperature above this, while the tubercle bacilli did not grow at all.

Milk varied greatly in its bacterial flora according to the territory from which it came; every county had some prevalent variety of bacteria different from that of any other; this had an

influence not only on the actual types of bacteria abundant in the milk, but also upon the deleterious products that were formed. The actual number of bacteria was not therefore necessarily an index of the probable harmful influence of the milk on infants. The ordinary milk from the average farm which had been kept cool for forty-eight hours which was sold in summer and averaged at least 2,000,000 bacteria per c.c., while apt to be very deleterious in infants, would usually produce no detectable bad effects in children above two years of age.

The usual types of bacteria obtained from can and utensils did little appreciable harm in cold weather; it was only in hot weather that the saprophytic bacteria and their products caused serious harm. Everyone recognized that during hot spells diarrhea became prevalent among infants fed upon cow's milk even when it was pure. The bacterial contamination of the milk was during such hot spells practically unchanged from its average summer condition, since by means of spring water at the farms and ice during transportation the milk, in spite of the temporarily increased heat of the air, was kept at about the same average temperature. In certified milk the number of varieties of bacteria was almost as great as in common milk, but the total number of bacteria was very much less. While it was true that it was only during very hot weather that serious diarrhea occurred, it was just as certain that the bacteria were an important factor in its production. Dr. Park referred to a test made by stopping the heating of milk to determine the effect on the infants of adding the bacteria to their food. A group of 50 babies were being fed on a modified milk pasteurized at 160°F. for twenty minutes. Half of those babies were given the same supply of milk, but without previous heating. This was in June. The living bacteria in the heated milk averaged about 10,000 per c.c., while in the unheated milk they numbered about 1,000,000. There was immediately a marked increase in the diarrhea in the half getting the unheated portion of the milk. Here there was nothing but the bacteria to be held accountable for this increase in the diarrhea. Heat and humidity predisposed the infant to intestinal diseases which cow's milk and bacteria tended to aggravate. The sick infants were taken off milk. When the milk was again pasteurized it was interesting to note that the babies' condition remained good. It seemed too that a certain immunity was acquired by an infant to the bacteria in the regular milk

supply. It seemed to Dr. Park that there could be no doubt that the bacteria in a child's intestines were fully as deleterious for other infants as those taken in cow's milk; but the infant's mucous membrane became immunized to them; a change from one milk supply to another caused a change in the bacterial contamination; new species of bacteria were introduced for which there existed no immunity. Most of them had known of infants that when fed on their regular supply no trouble occurred; but when the milk was changed there appeared diarrheal disturbances. This might be because the child became accustomed, or immunized, to the bacteria contained in the milk from a certain farm. The great difference in the results obtained in the ordinary family from the use of ordinary contaminated cow's milk and certified or of a properly modified and heated clean milk was very evident in every investigation made. Condensed milk, though free from bacteria, was not found to give good results. Those who had studied this subject knew that simply supplying pure milk would not save a majority of the lives now lost through improper feeding; there must be instruction in the preparation and modification of the milk, in the amount and frequency of feeding, and in many other things. The danger of cow's milk to infants was brought out by the discovery that although more than 75 per cent. of infants were nourished on mother's milk, 78 per cent. of the infants dying of enteritis were fed on cow's milk or patent foods. In Greater New York there were in 1908 6,190 deaths from diarrhea in children under five years. The Division of Child Hygiene estimated about 4,800 of these were fed upon cow's milk. If they reduced the mortality to the same percentage as in those fed on human milk they would save about 4,300 lives.

With regard to the pathogenic bacteria contained in milk, tuberculosis, typhoid fever, scarlet fever, diphtheria and tonsillitis were the chief diseases transmitted by means of milk. Measles is apparently not conveyed. The tubercle bacilli were in the majority of the cases derived from the cow, but might come from human sources; the typhoid bacilli were entirely from man; the contagion of true scarlet fever in milk was probably always from man. Diphtheria bacilli were probably always of human origin. As milk was usually kept below 60°F. the typhoid bacilli and the streptococci were the only germs that increased to any appreciable extent. The following epidemics and cases had been recorded in the bulletin of the Marine Hospital Service, as pro-

duced by cow's milk. The figures give an idea of the relative importance of the different infections:—

	Epidemics.	Cases.
Typhoid fever	179	6,900
Scarlet fever	51	2,400
Sore throat	7	1,100
Diphtheria	23	960

Within recent years the importance of typhoid carriers in the infection of milk has been recognized.

With regard to the relation of bovine to human infection in tuberculosis, much work has recently been carried out in New York. Up to the present time they had completed at the Research Laboratory studies on 470 cases of human tuberculosis. Of these 304 were adults, and of these but one case, and that not a severe infection, was due to a culture of the bovine type. In 281 cases of pulmonary tuberculosis all were due to the human type. Twenty-five of the 109 very young children and infants tested were infected with the bovine type, or about 23 per cent. Their total results indicated that about 2.5 per cent. of all tuberculosis existing in New York was due to the bovine type of bacilli, and therefore caused probably by milk infection. Dr. Park estimated that something over 1 per cent. of the total deaths from tuberculosis were due to bovine bacilli. In little children probably 10 per cent. of the total deaths from tuberculosis were due to the bovine type. The percentage of tuberculous glands in young children due to bovine bacilli seemed to be at least 50 per cent. As our knowledge of the connection between milk-conveyed bacteria and disease had become considerable, they had learned that children were subjected to many dangers which did not come to adults. This had led the Board of Health of the City of New York, under the guidance of Commissioner Lederle, to separate milk used by children from the general supply. After January 1st only the following varieties of milk could be distributed in New York City: "(1) Milk for infants sold in bottles or sealed containers. (a) Raw milk which has been certified to, or the equivalent. (b) A grade just below, an inspected milk, either from tuberculin-tested cows or pasteurized at a temperature of from 140° to 150° F. for a minimum of twenty minutes. (2) Milk for adults. Milk from ordinary farms shipped under ordinary conditions but pasteurized very carefully. (3) Milk

which can be used for cooking purposes. This from the poorer farms, where only the simplest precautions are taken." This separation of milk was intended to concentrate effort on the portion of the milk that required it and did not raise the cost of producing any grade beyond that believed to be necessary.

CHEMISTRY AND FOOD VALUE OF MILK.

PROFESSOR H. C. SHERMAN, Columbia University, emphasized the economy of milk as a food, the cheapness of good milk as compared with a corresponding quality of other perishable foods. One quart of milk in gross food value equalled 1 pound of meat, or 1 pound or two-third dozen eggs. Anyone who could pay 15 cents for a steak, or 22 cents a dozen for eggs could equally well pay 15 cents a quart for milk. At the usual prices the best grade of milk was as cheap as the cheaper cuts of meat, or as very ordinary eggs. It is important to teach this to the housekeeper, so that she will see that it is not out of proportion to her other expenditures to buy a good milk for the baby and for the other members of the family as well.

As a matter of fact the comparison of a quart of milk with a pound of steak did not do full justice to the food value of the milk, for it considered only the amounts of nutrients in the two foods and not their form.

That the forms of nutriment found in milk were of especially high food value was only what one would anticipate from the fact that milk was the one article whose sole function in nature was to serve as food.

Chemistry now offered at least two explanations of the generally accepted fact that milk protein was the best form to serve as tissue building material for the young mammal: (1) It contained in ample proportion every one of the known amino acid radicles needed by the body for the construction of the diverse forms of protein in the various tissues. (2) It contained phosphorus without purin in organic combination with the protein molecule, and there was strong experimental evidence that such a phosphoprotein was of greater nutritive value than a corresponding mixture of simple protein with simple phosphate.

Further, it must be counted an important factor in the food value of milk protein that it was less subject than other proteins to putrefactive decomposition in the digestive tract.

The carbohydrate of milk, while requiring but a single, simple digestive change to bring it into the monosaccharide form for assimilation, yet had the advantage of most other carbohydrates in being less subject to fermentation in the stomach.

The fat of milk had the advantage over most other fats in being already emulsified, so that it was readily accessible to the now fully demonstrated fat-splitting ferment contained in the gastric juice. For this reason the digestion of milk fat began in the stomach and went on more readily than that of most of other fats.

But in recent years they were coming more and more to realize that nutritive value cannot be expressed in terms of protein, fat, carbohydrate and calories alone. Some of the so-called inorganic elements are just as essential to nutrition as the protein and quite as apt to be deficient when the food is left to chance and the palate. Camerer estimated that of the three chemical elements—iron, phosphorus and calcium—the baby got in mother's milk no surplus over what was required to maintain a normal rate of growth. Recent studies had also shown that the typical family dietary did not furnish any great surplus of these three elements and was not infrequently deficient in one or more of them. Iron, phosphorus and calcium, therefore, required attention in planning dietaries and in comparing the nutritive values of food. Phosphorus and calcium were contained in milk in great abundance; iron was contained in small amounts but in forms of great nutritive value.

Since the percentages of iron in cow's milk and mother's milk are about the same, the child fed on modified cow's milk is apt to get less iron than would be obtained in the milk of a healthy mother.

DR. ROWLAND G. FREEMAN said that all were agreed that most of the diarrheas occurring in infancy were dependent upon the troubles with the chemical composition of the food or the bacteria it contained. Infections in children carefully fed on modified milk were rare. Children who were well fed and carefully watched rarely got diarrhea. Diarrhea was a very severe trouble in infancy. There were certain remote consequences of a serious nature, even from what might be supposed was a trivial diarrhea. An infant under a year of age that is not gaining in weight is in more danger of infections and diarrhea than one

that is gaining normally. The only way to avoid these diarrheas was by careful feeding, with a proper consideration of the chemistry of the food, and this brought up the whole question of the proper management of the infant. Under the teaching of Dr. Jacobi, we used diluted whole milk, preferably with a cereal. Then Dr. Rotch, of Boston, advocated the use of cow's milk modified to represent the chemical composition of mother's milk with two or three times as much fat as proteid and no cereal added. Experience soon taught, however, that the teachings of Dr. Rotch must be modified. Such a large amount of fat in a cow's milk modification was sufficient often to cause derangements. Cereals did aid in the digestion of the infant's food. Pediatricians had now come to this, the general use of these cereal decoctions in milk modifications. There were many men now who fed babies with scarcely more fat than proteids. When one used a modification of milk and wished to use high fats he should be very careful regarding the herd from which the milk came. A great deal of disturbance had been caused by the use of creams. High fats could cause very serious disturbances, such as colitis; about this there was no doubt. The value of fat with the food, however, should not be minimized. A fair amount of fat in the milk was rarely more than 3 per cent. Often they were not giving enough fat; this happened even when the baby was breast fed. Babies fed on breast milk low in fat and high in proteid often would not gain, but when to this some cream from cow's milk was added the baby would do well; fat was a very essential part of the diet.

Dr. Freeman said that sugars were very apt to cause disturbances; there were many babies who had a very poor digestion for sugars. After taking sugar of milk they often vomited. Some thrived better on malt sugar. Some babies gained better on cane sugar.

The high proteid diet advised by Finkelstein was now being used to a greater extent. By using higher proteids the amount of fat could be kept down without loss in the caloric value of the food. It should be borne in mind, however, that the Germans never used a great dilution of milk.

With regard to starches in infant food the old idea that babies were not able to digest starches had been controverted. Starch in the food in the form of cereal decoctions was of value to babies in modifying the curding of the milk and in supplying a mucilag-

inous material which stimulated the secretion of gastric juice. Whey proteids were more readily digested than whole milk proteids.

A very important thing to consider in the avoidance of diarrhea in infants was the interval of feeding. The Germans started with only five feedings a day. The general tendency here was to feed too frequently. To avoid diarrhea it was necessary during the first year of the child's life to keep the child gaining; any baby who was not gaining in weight was in danger. He recalled one child who had intestinal infantilism of Herter; this baby did badly for a time. The infant was then wet-nursed and did well for two or three months. Then there was a stationary weight for nine months while still on the same breast milk, and then colitis developed and the child had not gained in weight since.

Dr. Freeman considered the milk of Finkelstein to be of great value in some cases. It supplied buttermilk in a palatable form for infants. These infants, however, often would not gain in weight unless there was the proper amount of sugar and fat added to the food. Some babies that would not gain on the artificial foods would do well on Keller's malt soup.

With regard to the bacteria contained in the milk, they were more dangerous than any slight errors in the modification of milk. Clean milk should be given. Since their knowledge of the bacteriology of milk had increased there had been a great fall in the mortality, particularly in the ten years following this knowledge; during the period between 1890 and 1900 the infant mortality from diarrhea had been reduced one-half. Milk that contained many bacteria was very likely to produce a diarrhea.

With regard to the tubercle bacilli found in milk, Dr. Freeman thought we were all greatly indebted to Dr. Park, of the New York Department of Health, for his extensive work in showing how much tuberculosis occurred in infants and young children through the milk. The results of his work agreed with those of other observers. More than one-third of the cases of tuberculosis examined occurring in children under five years of age were of bovine origin. In feeding babies artificially, Dr. Freeman always obtained the cleanest milk possible and then pasteurized it. Commercially pasteurized milk as sold has never been clean. Dr. Park has mentioned that done by the holding process as containing an average of only 36,000 bacteria per

c.c., which is evidence of extensive recontamination after pasteurization.

DR. THOMAS S. SOUTHWORTH said that it was always profitable to come to listen to Dr. Park when he spoke of the workings of the Health Department. Having heard his accounts of the advance made one realized why it was that his bureau of the New York Department of Health stood at the head of the world. The very clear and common-sense plan for separating the different kinds of milk according to their use appealed, he thought, to all. At the various meetings held at different times in New York City no distinction had been made between milk for infants and milk for adults. Dr. Park proposed that milk for infants should be treated in one way, and that milk for adults should be treated in another way. This was common sense.

Professor Sherman had told them much that was of interest concerning the chemistry of milk. He had asked a question that Dr. Southworth thought he could answer from one standpoint. It was a pretty well-recognized fact, as the result of metabolism experiments, that the fats of cow's milk were not utilized to the same extent as the fats of human milk, showing a larger residue in the stools. Cow's milk also contained fat that was less easily digestible, and the larger unabsorbed residue might easily lead to digestive disturbances.

Dr. Southworth considered what Dr. Freeman had said concerning the stationary weight occurring during infancy; children were sadly wronged by being allowed to stand still in weight during the period of life when the natural tendency was toward growth. Keller's malt soup was often of the greatest value in the feeding of young infants. It was a common occurrence when an infant on some ordinary modification of milk was passing green and white stools to have the stools change in twenty-four hours to smooth yellow stools after a malt soup mixture properly adapted to the child's needs was substituted. The factor in the transformation was partly the different kind of sugar, but there was probably also a change in the bacterial flora of the intestines.

There could be no difference of opinion regarding the necessity of clean milk. Whether pasteurized or fed raw, the milk for infants must be clean. It had been demonstrated at the Brookside farm that it was possible to produce an almost ideally clean milk.

While the chief credit had been given to the limitation of the bacterial contamination at the dairy, it should not be forgotten that modern methods limited contamination after the milk left the dairy. He referred to bottling at the farm, greater care in handling milk in the home, and the use of separate feeding bottles for each of the infant's meals. These had been important factors in the reduction of morbidity and mortality. Diarrhea caused a large mortality among infants; this mortality could be without doubt greatly decreased by the use of clean milk and by the proper application of heat and cold to limit the number of bacteria contained in the milk.

DR. L. EMMETT HOLT mentioned the possibility of diarrhea being caused by milk sugar. Malt sugar, he said, is the most easily absorbed of all sugars, but is liable to cause vomiting. He had always looked with wonder at the amounts of malt sugar which the German pediatrics gave to children in malt soup. American babies seemed not to be able to handle such large amounts.

Dr. Holt was skeptical about the decrease in infantile mortality reported in New York City in late years. He had found that the rate twenty years ago was slightly lower than that of last year. He is not inclined to regard bacteria as the sole cause of diarrhea in summer. In his opinion high temperature has more to do with it. This would account for the fact that London, whose milk is less carefully cared for than that of New York or Chicago, has a lower mortality from summer diarrhea.

DR. HENRY DWIGHT CHAPIN thought that the new classification proposed by the Board of Health was a very important one. Dr. Park had asked for criticisms and Dr. Chapin had but one to make. There were three sources from which to obtain clean milk, the certified, the Walker-Gordon, and the guaranteed milk. Confusion here came in. He was sorry that the Board of Health guaranteed milk. It should guarantee all the extra clean milk or none at all. This introduced an element of confusion. He proposed that the Board of Health of the City of New York should take hold of this question of certified milk and carry out the work, as was being done by the Medical Society of the County of New York or withdraw entirely and let the county society do all the work. Dr. Chapin did not think it was fair for the Board of Health to guarantee any one dairy.

With regard to the question of high fats, Dr. Chapin thought

they had gone too far; they had gone from one extreme to the other. A few years ago all were for high fats; to-day the pendulum had swung the other way and they were for low fats. This was wrong. If a proper amount of fat was given it could be properly digested by the infant. If the present teaching was followed, it would be followed without doubt by cases of rickets. The infant's nutrition would suffer.

Dr. Chapin could not agree with all that was said regarding the giving of cream. This varied from 10 to 50 per cent. of butter fat. If one took the proper level of top milk they would get the fats and proteids they wished and in proper proportion. Dr. Chapin wished to protest against the prevalent teaching regarding fats. Infants could digest a certain amount of fat and do very well on it.

They had been told that Keller's malt soup and Finkelstein's milk did well, and so they did in some cases. But they should understand the principle that underlay the giving of these foods. They were changing the form and character of the food. When a baby was doing badly on a certain food, change the food, and especially change the flavor of the food, and that infant would often fare better. The giving of Keller's malt soup was, in fact, giving maltose; the benefit was derived from this giving of maltose, which was easily assimilated. One was giving something that the infant required. Finkelstein's food in certain forms of diarrhea did very well, but not in those cases that were far advanced. This really was giving a form of proteid finely split up. The benefit from the giving of this food was not from any fear that the sugar contained therein would do harm, but the giving of the proteid in a form that could be easily assimilated.

DR. WILLIAM L. STOWELL said he had always been much interested in the clinical value of fats, but he had never gotten good results from a very low proteid or low fat diet; he gave high proportions of each. Most infants, even very young ones, were able to take percentages near normal. He never was a high dilutionist.

Dr. Stowell was much interested in the statistics Dr. Holt had presented to the Section, that the number of deaths from diarrheal diseases was less than it used to be, and particularly in New York City. Many elements entered into the results. The percentage of deaths from infantile diarrhea throughout the

registration area was too high—91.5 per 100,000 population. It had been 10 per cent. lower, therefore they should exert themselves to check the mortality. If New York City could make a gain of 55 per cent. in as many years, the country at large should do the same.

DR. FREDERIC H. BARTLETT referred to Dr. Holt's statement that the reduction in the infant mortality during the summer months had shown but little change in the last ten or twelve years. The corrected statistics in Germany showed that there had been no marked reduction in the mortality among infants as related to diarrheal diseases in the last two decades. Great strides had been made in the supply of milk for infants; the question arose why it was that, with this pure milk supply, the mortality had not been materially reduced. Finkelstein and other observers in Germany had made the statement that the factor chiefly responsible for the large infant mortality in summer was not the bad milk or the bad feeding as a primary cause, but the overheating such as existed in the houses. In these buildings the heat was often from 5° to 10° C. above that of the outside air. Even at night there was but little reduction in contrast to the outside air. As a result of this, in many infants there was produced an increase in the body temperature; this increase in the body temperature affected the child, especially one who was badly nourished or who suffered from digestive disturbances.

To make his point more clear Dr. Bartlett asked them to consider a certain number of infants, some healthy and some with low digestive powers, who were subjected to heat, especially in overheated rooms, for a certain period of time. A healthy child would show but a slight rise in temperature, but the others would show a decided increase in the body temperature. From analogy it seemed that infants in the cities who were subjected to the high summer temperatures suffered from disturbances or severe digestive disorders more. When a hot spell appears many of them die; when there appeared a temperature of but moderate degree very few die within twenty-four or forty-eight hours; most of them get well. During the summer when there was a high temperature lasting for two or three days, 85° to 90° F., as a result a large number of infants would die within two or three days. When the temperature was between 80° and 90° F. the infant mortality was greatly increased. Was this mortality

caused by the bacteria contained in the milk or by the formation of toxins or toxic substances in the milk? Acute diarrheas did not terminate in that way. Dr. Bartlett did not think that there was any specific relation between the high temperature in causing the summer mortality and the bacterial content of the milk or of the food.

DR. WALTER D. LUDLUM recalled a conference held with the Commissioner of Health in which the conferees not connected with the department took a decided stand against guaranteed milk, urging its elimination from the sanitary code, and received from the commissioner the impression that it would probably be so eliminated.

Dr. Ludlum offered the following resolution, which was seconded and unanimously carried:—

“Resolved: That the Pediatric Section of the Academy of Medicine deplores the guaranteeing milk and that the Department of Health should be notified that this is unnecessary and undesirable; the Section on Pediatrics would urge upon the Board of Health the necessity of modifying its sanitary code so as to eliminate the milk so named and so guaranteed.”

DR. ELI LONG said that all appreciated the great importance of the bacteriology and chemistry of milk, but there are other factors of other significance, viz., general hygienic measures. Great advance had been made in teaching mothers in regard to these. And this teaching is one of the greatest, if not the greatest, argument of milk stations. The cleaner the milk, of course, the better.

DR. WARD B. HOAG emphasized the importance of taking into consideration the interval between feedings; this was a very big factor for consideration; the general tendency today was to feed the infant every two hours during the day; that was, he believed, the rule. It requires from two to three hours for the stomach to take care of the food introduced; therefore a longer interval should be given between the feedings. If any rule were formulated it should be three hour intervals during the day and four hours at night, seven feedings in the twenty-four hours; this till the child is four or five months of age, then cut out the night feeding, the child sleeping from 10 P.M. till 6 A.M. The child will do this if he gets sufficient nutrition during the day.

THE PHILADELPHIA PEDIATRIC SOCIETY.

Meeting April 13, 1911.

DR. J. TORRANCE RUGH, PRESIDENT.

The following papers were read:—

“The Dietetic Management of Disturbances of Gastric Digestion in Infants.” By Dr. Alfred Hand, Jr. (See p. 644.)

“The Anatomical Position and Shape of the Infant’s Stomach from Frozen Sections.” By Dr. J. C. Gittings.

On the basis of his examination of the shape and position of the stomach in the hardened bodies of infants, Dr. Gittings believes that the oft-repeated statement that the infantile type of stomach is tubular is incorrect, as is also the more recent view of Roentgenologists that the stomach in infancy does not materially differ in shape and position from that of adults.

“The Surgery of the Infant Stomach.” By Dr. Edward Hodge. (See p. 657.) And

“The Diagnostic Value of Gastric Analysis in the Digestive Disturbances of Infancy.” By Dr. T. Wood Clarke, of Utica, N. Y., by invitation. (See p. 648.)

DR. D. J. MILTON MILLER, of Atlantic City, N. J., in opening the discussion, said that, of late years, in the infant as in the adult, we have come to look upon the stomach as taking but a minor part in the process of digestion, being mainly a reservoir for permitting the food to pass slowly into the intestine, where the major part of digestion is carried on and completed. Yet Dr. Miller agreed with Dr. Hand that we could not get along without the stomach; if it fails in acute or chronic disease, we have lost our sheet-anchor. Its usefulness becomes apparent when we consider that, in abnormal conditions of this organ, we are deprived of the means whereby the food is not only partially prepared for, but is also introduced slowly into the duodenum. Such researches as these of Dr. Gittings are of material value. Dr. Miller had long ago arrived at the conclusion that it was im-

possible to determine the position and shape of the infant's stomach by ordinary methods, such as filling with air, water, auscultatory percussion, etc. He believed that the only way to establish abnormal positions or dilatation of the stomach was by the X-ray. Dr. Miller was sorry that Dr. Gittings had not given some information as to the capacity of the stomach. The usual method, measuring capacity after death, did not seem reliable. Yet it is an interesting fact that such measurements tally very closely with the amounts determined by clinical observation. Dr. Miller thought we had not done our full duty to our little patients if we did not give them the benefit of a gastric analysis, just as we do in adults. Hence we should familiarize ourselves with the proper methods for determining the presence of HCl, etc., which are not difficult or too time-consuming. It has always been taught that from 25 to 50 per cent. of lime water hastened the evacuation of the stomach. But gastric analyses show that the opening of the pylorus is due to acid. Yet, in hyperacidity, emptying the stomach is delayed. Dr. Miller thought that hyperacidity was a very potent, if not the principal, factor in causing the symptoms of pylorospasm or pyloric stenosis. Thus it seems possible that varying degrees of acidity may cause varying degrees of obstruction; hence the practical value of gastric analysis in enabling us to detect and correct the earlier stages of what may develop into a serious affection. We may be able to distinguish the delayed motility due to fat from that due to hyperacidity and thus obtain valuable indications for treatment. Diet occupies a high, if not the principal, place in the treatment of infantile gastric disorders. Careful examination of the feces is also important. No set rules can be followed; every case must be judged for and by itself. Fat leaves the stomach last, delaying the emptying of the organ, and is a greater source of trouble than the proteids; hence the value of skim milk, buttermilk, whey and even condensed milk in the gastric disorders of infants. It is well to remember that very troublesome cases, those whose struggle to digest cow's milk has made their lives one long trail of misery, will often improve when they reach an age when they can digest other food than milk, which to them is a poison. The human breast is curative, in many cases, of difficult digestion in infants, even as old as one year. Finally, we should never feed an infant when its stomach is full or contains food. By passing the

tube we can discover when the stomach is empty and should feed only when it is found empty.

DR. CHARLES A. FIFE agreed with Dr. Hand that very few formulæ were needed. Modifications of less than $\frac{1}{2}$ per cent. unnecessarily complicate the system of percentage feeding. It is becoming more and more evident that the dangers of high proteid feeding have been exaggerated, and that many of the digestive disturbances formerly attributed to them are more likely due to the fats. This warrants a simplification of the methods. In fact, dilutions of whole milk or top milks with varying amounts of boiled water and the addition of sugar meet most of our requirements. The questions of amount of food and of intervals of feeding received scanty attention this evening, though all of the members will probably admit that these two problems are fully as important as the moot point of quality. How often in cases of indigestion, atonic dyspepsia, intestinal indigestion and athrepsia do we get a history of overfeeding both as to quantity and quality! The pathologists continually report that the stomachs in the malnutrition cases are enormously dilated, thin-walled and apparently atrophic. It is not unreasonable to expect that overfeeding results in gastric dilatation, lessened motility, deranged gastric, intestinal, pancreatic and hepatic secretions, absorption of decomposition products, faulty metabolism and death. If physicians would more frequently check up their formulæ by determining the caloric values they would probably see fewer atrophic infants. Dr. Fife asked Dr. Clarke if he had found organic acids in the stomach contents of babies with retarded gastric motility.

DR. GITTINGS said that the so-called modern view as to the functions of the stomach seemed the more rational when we stop to consider that the ducts of those most important organs, the pancreas and liver, empty into the intestines, and when we compare the actual extent of secreting surface in the stomach with that in the upper intestine. The main function of the stomach would seem to be principally motor, whereby the food is thoroughly mixed, acidified and softened to be delivered by the pylorus at proper intervals to the much more important digestive action exerted in the intestine. Symptoms originate from inability of the stomach to empty itself at proper intervals or in a proper

manner. That the atrophic infant who retains his food has a better chance than his more unfortunate brother who rejects it does not prove the greater importance of gastric digestion as compared with gastric motility. Several years ago Dr. Gittings started a series of investigations in the gastric contents in infancy, but from the varying results it seemed hopeless to draw any significant conclusions. That clinical indications for treatment can be obtained from the use of the stomach tube, however, is more than sufficient justification for its much wider use.

DR. A. H. DAVISSON said that he was strongly of the impression that a too high per cent. of fat in our percentage feeding had been used and was a cause of indigestion; a high proteid could be well taken, more especially if the proteid was started low and run up quickly. He had had marked success in cases where he had used whole milk and a diluent only, starting the mixture very weak, but increasing the strength quickly, so that a high proteid was soon reached with a fat per cent. that was not much in excess of the proteid. He had gotten out of the custom of using lime water and for years had used it very little, seldom as an addition to a modified milk.

DR. CLIFFORD B. FARR said that he also had had satisfactory results from titrating unfiltered stomach contents, as long since recommended by Martius. He explained the manner in which the pylorus was kept closed in pylorospasm by the generally-accepted hypothesis that the excess of acid which on the stomach side causes the pylorus to open, on the duodenal side causes it to close again and to remain closed until the alkaline reaction is restored.

DR. HAND said that Dr. Clarke's results and his remarks on the strong affinity between casein and HCl bore out what Dr. Hand said with reference to the presence of curds in the stools when very low percentages of proteids are given; the relative excess of acid after the casein has been precipitated acts upon the curd to toughen it, so that it is indigestible; increasing the strength of the mixture gives more casein to combine with the acid, the curds are softer, are digested easily and none appear in the stools.

DR. GITTINGS added that investigations as to the capacity of the stomach had not been undertaken, in order that the members

of the Society might see the position and shape of the stomach exactly as they existed at the time the bodies were injected.

DR. CLARKE added that in those cases in which he had given lime-water mixtures, hard, tough curds were found, and it was almost impossible to secure all of the stomach contents on this account. When milk and water were used there were also curds, but not nearly such tough ones. Lime water did not accelerate the motility and did not increase the acidity. No trace of lactic acid was found in normal babies. Langstein has found peptones in the normal infant stomach. Dr. Clarke found a slight increase of peptone nitrogen, if the test meal was examined at once; this increased tremendously if the contents were placed in the thermostat, showing proteolytic power but little proteolytic activity in the stomach. He also believed that the pylorus was kept closed by the amount of acid in the small intestine in cases of pylorospasm. He reiterated the statement that, with uniform methods, we ought to obtain scientific results of some value from gastric analysis in infants.

PHOSPHORUS IN RACHITIS.—The use of phosphorus in rachitis has rested hitherto entirely on an empirical basis, and the remedy has fallen in this country into disrepute. Schabod's work (*Zeits. für Klin. Mediz.*, Bd. 67, Hft. 5 and 6), proving by exact metabolism studies that phosphorus has a very distinct action in rachitis, is therefore very welcome. He found the retention of calcium in rachitic children increased threefold under the influence of phosphorus, given in the form of a solution in cod-liver oil. The drug had no effect whatever on the calcium retention in healthy children. The effect of phosphorus was evident within a few days and persisted unenlarged so long as the drug was given. Two months after it was discontinued the calcium retention was still higher than before. The action of phosphorus must consist in a specific irritation of the bone, for it is given in too small quantities to account directly by combination with calcium and deposit in the bone, for the increased retention of calcium. Since rachitic bones have been shown to contain much too little calcium, the indication for phosphorus is clear. It is to be hoped that these researches will bring about a renewed use of phosphorus in this country in the treatment of rachitis.—*Boston Medical and Surgical Journal*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. CHARLES E. FARR.	DR. C. D. MARTINETTI.
DR. S. FELDSTEIN.	DR. S. W. THURBER.
DR. ALFRED F. HESS.	DR. FRITZ B. TALBOT.
DR. CHARLES OGILVY.	

DISEASES OF EAR, NOSE AND THROAT.

LOUGHRAN, ROBERT L.: A CASE OF SINUS THROMBOSIS WITH EXTENSIVE ACCUMULATION OF FLUID PUS IN THE SINUS.—RECOVERY AFTER RESECTION OF THE JUGULAR VEIN. (*Annals of Otology, Rhinology and Laryngology*, March, 1911, p. 134.)

This boy of six years was admitted to the Manhattan Hospital July 1st with a history of measles beginning May 11th, which had cleared up in two weeks, but had left him with a double otitis media purulenta. The left ear got well in two weeks and the right in three, and the boy was perfectly well for two weeks thereafter. Ten days before admission he had had a chill and severe headache, most marked in the occipital region. This was accompanied with earache on the right side referred to the mastoid region, and the examination of the drum showed no middle ear involvement at all. Mastoid tenderness to pressure did not appear until two days previous to admission. The temperature had varied, but had been up to 105°F. on some days.

On admission the temperature was 104°F., pulse, 140. The drum was incised and a small amount of bloody serum evacuated. Culture of this fluid showed streptococci. The next day the mastoid was opened and the sinus exposed and found to be congested and red, but apparently not thickened. The wound was observed for five days. A leukocytosis of 22,444, with a polymorphonuclear per cent. of 71, dropped to 13,777, with 66 per cent. The sinus began to look gray, though the patient was evidently doing well, complained of no pain. On opening the sinus by an incision of about two inches, the lumen was found to be filled with fluid yellow pus walled off from the rest of the sinus by clots. This pus contained bacillus pyocyaneus and staphylococci. Patient discharged cured at the end of a month.

The points of interest in this case are the infection of the sinus without lighting up the resolved middle ear infection and the slow disintegration of the thrombus. S. W. THURBER.

PATHOLOGY.

ROTHE, DR.: EXAMINATIONS ON TUBERCULOUS INFECTIONS IN CHILDHOOD. (Part II., Publications of the Robert Koch Foundation.)

Rothe publishes a continuation and amplification of Gaffky's previous work. He examined the bronchial and mesenteric nodes of 100 children under five years of age, the material being taken from successive autopsies in cases dying of various causes. Guinea pigs were inoculated with this material, and in turn cultures of the tubercle bacilli were isolated and differentiated.

Of the 100 cases 21 per cent. showed tuberculosis, which is about what we would expect. This is, however, in contrast to the findings of Gaffky on 300 cases under fourteen years of age. In these older children only 19 per cent. of tuberculosis of those nodes was found. It is difficult to harmonize these figures, and we may note that the figures of Gaffky are surprisingly low for children of this age.

All in all in the 400 cases the mesenteric nodes were involved in 14 cases, the bronchial nodes in 22 cases, and both groups in 42 instances. The number of infections from the human type of bacillus were 75 and that from bovine infection 3 in number. Of these 3 Rothe was unable to isolate successfully 2. However, as he says, the very difficulty of isolation is strong evidence of the fact that he was dealing with the bovine bacillus.

If we exclude these 2 cases and consider that we have only 1 bovine case, the percentage of bovine tuberculosis is $1\frac{1}{3}$. This the author does, following the school of Koch, who denied so strongly the importance of bovine tuberculosis. However, if we include those 2 cases the amount of bovine tuberculosis comes to $4\frac{3}{4}$ per cent., which is about what would be expected, judging from previous statistics of cultures made from this material.

All in all the work of both Rothe and Moeller shows us that, although pulmonary tuberculosis is caused solely by the human bacilli, glandular tuberculosis is often caused by the bovine type of bacillus. Had the glands of New York children been subjected to examination, there is no doubt but that a far larger percentage of bovine infections would have been encountered.

ALFRED F. HESS.

SURGERY.

BRETSCHNEIDER, A.: PRIMARY SUPPURATIVE PAROTITIS OF EARLY INFANCY. (*Archiv. für Kinderhk.*, Vol. LV., Parts 3 and 4, p. 199.)

The author reports 2 fatal cases. In one case nine weeks old, infection of the other parotid followed fourteen days after the first. Death resulted from accumulation of pus in the mediastinum and right pleura. The staphylococcus was the infecting germ. The second, five weeks old, was probably suffering from hereditary lues. Death was due to aspiration pneumonia. Staphylococci were found in the pus. The author found 11 cases in the literature, excluding the 2 of his own, reported mostly by French clinicians. In most of the cases the disease begins in the first few days or weeks of life. The fever is usually high. In 31 per cent. of the cases the birth was premature. Two infants had congenital lues. There is a swelling in the parotid region which is tender, and at first not sharply circumscribed, later it becomes localized below and in front of the ear. The pathognomonic sign is escape of pus from Stenson's duct on pressure over the tumor. The gland breaks down and suppurates. The mortality was 69 per cent., but this may be due to the fact that only the severest cases have been recorded in the literature. Death is due to the disease itself or to complications. The complications are due either to direct infection or to metastases. The pus may rupture into the external auditory canal, or it may descend into the mediastinum, as was the case with one of the author's patients. The duration of the disease varied from one day to three and one-half weeks. The author thinks that, as a rule, the disease is due to an ascending infection along Stenson's duct. In these cases there may be a congenital dilatation of Stenson's duct, or insufficient secretion of saliva by the parotid gland. In some cases the infection may be hematogenous in origin. When fluctuation is present, active surgical treatment must be adopted. Breast feeding is essential.

S. FELDSTEIN.

GAUGELE, K.: CONVULSIONS AFTER ORTHOPEDIC OPERATIONS. (*Zentralblatt für Chirurgie*, April 22, 1911, pp. 565-596.)

Gaugele has had 2 cases of convulsions following reduction of congenital dislocation of the hip, but he does not believe that they were caused by fat embolism, as Schanz claims. The more likely explanation is the excitement caused by a prolonged visit from

the family. The convulsions, which developed immediately after the visit, were epileptiform in nature, and were quickly relieved by saline infusion. A third case seemingly of true fat embolism developed after the correction of a paralytic club-foot, with intense pain in the abdomen and heart, pallor, vomiting, and an irregular and rapid pulse. Here also salt solution, subcutaneously given, relieved the symptoms within two hours.

CHARLES E. FARR.

ARUMUGUM, J. V.: 2 CASES OF EXTRAPERITONEAL TRANSPLANTATION OF URETERS INTO THE RECTUM FOR EXTROVERSION OF THE BLADDER. (*American Journal of Surgery*, May.)

Two patients, both boys, one eighteen, the other thirteen years of age, were operated upon by the author more than four years ago. The ureters were transplanted into the rectum according to the method of Peters, and the results were very successful in each case. The patients were able to retain urine for about six hours by day, and for eight or nine hours at night. The health of each was good.

CHARLES E. FARR.

ORTHOPEDIC SURGERY.

ALLISON, NATHANIEL: MUSCLE GROUP ISOLATION, AND NERVE ANASTOMOSIS IN THE TREATMENT OF THE PARALYSES OF THE EXTREMITIES. (*The American Journal of Orthopedic Surgery*, August, 1910.)

Allison reports the results on 14 operative cases, which he divides into the three following groups:

I. Athetoses and spasticities, treated by muscle group isolation, 9 cases.

II. Flaccid paralyses, treated by muscle group isolation and nerve anastomosis, 4 cases.

III. Complicated tic movements, treated by induced paralysis, 1 case.

CHARLES OGILVY.

MEISENBACH, ROLAND O.: A CONSIDERATION OF THE CHEMICAL AND MECHANICAL STIMULATION OF BONE, WITH REFERENCE TO THE EPIPHYSEAL AND DIAPHYSEAL LINES. RESULTS OF ANIMAL EXPERIMENTATION. (*The American Journal of Orthopedic Surgery*, August, 1910, p. 28.)

The first substance used was water, injected to ascertain

whether or not the mere penetration of the needle with the injection of a sterile solution would produce any pathological condition.

Sterile graphite pegs were used to see whether mere mechanical stimulation would have any effect. *Staphylococcus pyogenes aureus* vaccine was used in order to produce a local toxemia, and again in other instances sterile graphite pegs and *staphylococcus pyogenes aureus* vaccine were injected simultaneously. In some cases pure tincture of iodine and in others carbolic acid was used in order to produce a chemical irritation. Lastly, formalin was used. It was used to see whether a local aseptic insoluble compound acting as a foreign body and at the same time acting chemically would stimulate bone-producing elements.

As a result of experiments on 42 rabbits, extending over five months, Meisenbach draws the following conclusions:

1. Blanchard states that normal bone ossifies slowly, and from these experiments it can be seen that stimulated bone ossifies rapidly.

2. Stimulation of bone may be produced by mechanical, chemical or biochemical means.

3. Mechanical stimulation chiefly affects perichondral bone formation, whereas chemical stimulation affects the epiphyseal line directly, causing proliferation of cartilage cells and increased zones of provisional calcification and calcified matrix together with osteogenetic tissue chiefly derived from the perichondrium.

4. Mechanical stimulation is slow, whereas chemical stimulation is rapid and acts more universally, affecting the active bone-producing elements.

5. The combination of chemical and mechanical stimulation increases both the perichondral and endochondral bone formation.

6. Retardation of growth may occur if the zone of provisional calcification is destroyed or if this zone is infiltrated by excessive blood clot or by destructive processes.

7. Of all the substances used, formalin has produced the best results, on account of its antiseptic properties and its affinity for protoplasm.

8. Formalin injected upon the epiphyseal and diaphyseal lines acts as an insoluble compound and therefore affects the epiphyseal line both mechanically and chemically with a distinct local rather than a systemic tendency. It causes the formation

of osteogenetic tissue by influencing the zones of provisional calcification and calcified matrix and by increasing the number of osteoblasts derived from the perichondrium.

CHARLES OGILVY.

MEDICINE.

BRUCHNER, MAX.: PAROXYSMAL HEMOGLOBINURIA. (*Jahrb. für Kinderhk.*, February 1, 1911, p. 131.)

Serologic studies on a child suffering from paroxysmal hemoglobinuria and associated with lues, as a result of chilling, showed that when the blood was first cooled and then warmed, hemolysis occurred. It did not take place when the blood was either cooled or warmed alone, or when the serum and red cells were cooled and warmed separately. It is to be assumed that the serum of the patient possessed a substance acting on the red cells in the cold. Heated to 55°F. no hemolysis occurred. Reactivation with normal serum was successful. The serum of the patient had a similar action on other human erythrocytes as on his own. After an attack hemolysis was generally more marked. The reaction has nothing to do with the Wassermann. The condition may be explained as follows: As a result of infection, especially with lues, hemolytic amboceptors are formed, which in the cold unite with the red cells and later in the presence of complement produce hemolysis. Normal persons do not possess this amboceptor; in general paralysis, however, it is frequently present.

S. FELDSTEIN.

LOVETT, ROBERT W., AND SHEPPARD, PHILLIP A. E.: THE OCCURRENCE OF INFANTILE PARALYSIS IN MASSACHUSETTS IN 1910. REPORTED FOR THE MASSACHUSETTS BOARD OF HEALTH. (*Boston Medical and Surgical Journal*, May 25, 1911, p. 737.)

The disease in Massachusetts was nearly as prevalent in 1910 as in the previous year, and affected 153 cities and towns instead of 136 as in 1909. But one must remember that a much larger proportion of cases are now recognized and reported in Massachusetts than was formerly the case, so that probably the apparently relative prevalence of the disease in Massachusetts when

compared to other states, the total number of cases in the state and the apparent spread are in some measure due to the alert attitude of the medical profession of this state in recognizing and reporting cases. A large epidemic center existed in Springfield, with 148 cases in the city and a large number in the surrounding towns, the distribution appearing to be radial from Springfield. Another epidemic center existed in Fall River, with 89 cases in the city and more or less radial distribution to contiguous towns. It is evident that the disease has existed in all classes in the community, and not only among the lower classes, from the report on the sanitary conditions under which the patient lived, and also that it exists under all conditions of sewage disposal and with all kinds of water supply. Our researches in the last two years have failed to show an excessive amount of dust in affected localities. The proportion of affected houses in which contemporaneous sickness, paralysis or death existed in domestic animals or birds still seems larger than one would naturally expect. The occurrence of 6 cases in the colored race is of importance in connection with the data of other investigators, who have found the race rarely affected. The facts given with regard to communicability are to be regarded as important, 42 such histories having been obtained in 200 cases. No definite information as to any one factor is to be found in the antecedents of the attack, since bathing, falls, exposure to heat, over-exertion, etc., are common occurrences in children of the affected age in the summer season; nor in the study of diet does there seem much of importance, except for the existence of the disease in 4 nursing babies. The fact has been commented on that the disease was a little more prevalent this year in older children than in 1909. The study of the immediate antecedents of the attack and the early symptoms show nothing of especial interest except the very common occurrence of pain and tenderness, and the information as to its duration is of value. The distribution of paralysis was made by a skilled investigator in a group of cases carefully studied, and it is important to note under those conditions the comparatively frequent involvement of the back, abdomen, neck and face—a matter often overlooked. The per cent. of total recoveries from the paralysis within a period of six months and less after the attack was 13.5 per cent. in 200 cases as against a per cent. of 16.7 per cent. in a similar class of cases in 1909. For the year 1911 the State Board of Health intends

to pursue the same investigation as in the four previous years on a more extended scale, hoping by a study of the disease in one locality over a term of years to reach some conclusions as to its characteristics. As in former years the board is under great obligations to the medical profession for their ready coöperation at all points and asks for the coming year the same ready assistance.

FRITZ B. TALBOT.

WALKER, I. CHANDLER: TUBERCULOUS MENINGITIS WITH LEUKOCYTOSIS AND A PURULENT EXUDATION CONTAINING MANY BACILLI. A CASE REPORT. (*Boston Medical and Surgical Journal*, June 8, 1911, p. 816.)

A young adult with physical signs of meningitis, fever and leukocytosis shows on lumbar puncture spinal fluid turbid, containing 98 per cent. of polymorphonuclear leukocytes and very many bacilli, with the morphologic and tinctorial peculiarities of the tubercle bacilli, yielding by animal inoculation the typical lesions of tuberculosis. The case is reported to emphasize the fallacy of diagnosing meningitis as due to pyogenic cocci, from obtaining a turbid spinal fluid containing a large excess of polymorphonuclear leukocytes.

FRITZ B. TALBOT.

McKEEN, SYLVESTER, F.: SUDDEN DEATH FOLLOWING A PROPHYLACTIC DOSE OF DIPHTHERIA ANTITOXIN. (*Boston Medical and Surgical Journal*, 1911, Vol. CLXIV., p. 503.)

An apparently normal patient, except for previous attacks of asthma, was given 500 units of state antitoxin. Fifteen minutes later she became pulseless, cyanotic and unconscious. Breathing was difficult and froth and serous fluid ran from the nose and mouth. Autopsy showed a persistent thymus gland weighing 25 gm., and the anatomic diagnosis was status lymphaticus.

FRITZ B. TALBOT.

HONEIJ, J. A.: COMMON COLDS. (*Boston Medical and Surgical Journal*, 1911, Vol. CLXIV., p. 604.)

The writer investigated the incidence of common colds and the financial loss per person and came to the following conclusions: The most prevalent month in the year is March. There was an average loss of \$21 per person for six months due to absence from work. He advocates isolating individuals suffering from common colds.

FRITZ B. TALBOT.

DÖBLIN, A.: SALVARSAN IN INHERITED SYPHILIS IN INFANTS. (*Berlin. klin. Woch.*, March 20, 1911.)

Döblin reports the use of salvarsan in 6 infants without improvement. One child died from salvarsan poisoning. The subcutaneous, or intramuscular method, was used in each case. Four of the 6 cases died and the postmortem examinations were suggestive of arsenical poisoning. The author concludes that 5 mg. per kilogram of body weight is a sufficient dose, and that 30 mg. may be regarded as a fatal dose for an infant under three months of age.

CHARLES E. FARR.

THERAPEUTICS.

HOUSSAY, F.: RED WINE ENEMATA IN INFANTS. (*Arch. de Med. des Enfants*, No. 11, 1908.)

Houssay extols the efficacy of red wine enemata in infantile diarrhea. Convulsions following this treatment were not due to alcohol poisoning, but caused by faulty management of the case. He reports 2 more cases completely cured. The explanation given of the exact action of the wine is not very clear—the author seems to think it the result of osmotic tension of the solution and of its particular chemical properties combined.

C. D. MARTINETTI.

FOX, HOWARD: THE ACTION OF SALVARSAN UPON THE WASSERMANN REACTION. (*Boston Medical and Surgical Journal*, June 1, p. 776.)

It is difficult at the present time to draw general conclusions, owing to the great discrepancies in the results of various observers. These discrepancies are partly due to the different methods of injection and to the different stage of the disease in which the injections were given. The results of a single injection given by either the intravenous or intramuscular methods are, as a rule, rather unsatisfactory from the serologic standpoint. Repeated injections seem to have given better results and offer a more hopeful outlook for the future. The action of salvarsan upon the Wassermann reaction is in general analogous to that of mercury. The effect upon the Wassermann reaction is much less favorable than upon the clinical manifestations of syphilis.

FRITZ B. TALBOT.

SHATTUCK, F. C.: HEXAMETHYLENAMINE AS A POSSIBLE PREVENTIVE OF PNEUMOCOCCUS EMPYEMA. (*Boston Medical and Surgical Journal*, June 15, p. 842.)

Dr. Shattuck concludes that the results reported are certainly not encouraging to the hope that in hexamethylenamine we may have a preventive for empyema, one of the most frequent, and, from the point of view of the comfort of the patient, the most serious sequelæ of pneumonia. These results, however, suggest that this drug may be a preventive of pericarditis and otitis media. Of course, it may be a mere coincidence that neither of these complications developed in the hexamethylenamine cases, but the contrast between the two series leads one to continue the use of the drug, and thus perhaps to arrive at more definite conclusions."

FRITZ B. TALBOT.

BACTERIOLOGY.

MOELLER, B.: ON THE TYPE OF TUBERCLE BACILLI IN THE SPUTA OF CONSUMPTIVES. (Part I., Publications of the Robert Koch Foundation.)

Moeller reports on cultures isolated from the sputa of 51 cases of pulmonary tuberculosis. In some instances numerous cultures of the same case were undertaken. The results are merely a confirmation of the results of others, namely, that all cases of pulmonary tuberculosis are due to the human type of bacillus. The author fails to mention ages of the patients from which the sputa was obtained.

ALFRED F. HESS.

INFANT FEEDING.

TALBOT, F.: CASEIN CURDS IN STOOLS OF INFANTS. (*Jahrb. für Kinderhk.*, February 1, 1911, p. 159.)

The author offers a biologic proof that the tough curds of infants' stools contain casein. By injecting animals with cow casein he succeeded in obtaining a serum containing a specific precipitin. He then showed that the curds reacted exactly as did casein of cow's milk. Three normal stools of artificially-fed infants did not contain casein, as shown by the precipitin reaction.

S. FELDSTEIN.

[See ARCHIVES OF PEDIATRICS, Vol. XXVII., p. 440.]

BOOK REVIEWS.

WOMAN. A TREATISE ON THE NORMAL AND PATHOLOGICAL EMOTIONS OF FEMININE LOVE. By BERNARD S. TALMEY, M.D., Gynecologist to the Yorkville Hospital and Dispensary, New York. Sixth enlarged and revised edition. Pp. 262. New York: Practitioner's Publishing Co., 1910.

This, as is very well known, is an excellent book. It treats of a very old subject, but does it in a new way. We are accustomed to books on sexual matters, but they are usually written more from the male than the female standpoint. Dr. Talmey's book emphasizes the female point of view and is therefore a distinct contribution to the literature of this important subject.

GENESIS. A MANUAL FOR THE INSTRUCTION OF CHILDREN IN MATTERS SEXUAL. For the Use of Parents, Teachers, Physicians and Ministers. By B. S. TALMEY, M.D., Gynecologist to the Yorkville Hospital, New York City. Pp. 194. New York: The Practitioner's Publishing Co., 1910.

This book attempts to outline the method by which children shall be told of the matters of birth and reproduction and details the necessary information and proper times of imparting it to the child. Dr. Talmey takes the proper ground that the facts of generation must be presented in a way which cannot arouse any but admiring thoughts in the child's mind, and if the various steps which he outlines work out as it seems they should this little book will be worth its weight in gold.

BOOKS RECEIVED.

GOLDEN RULES OF PEDIATRICS. By JOHN ZAHORSKY, A.B., M.D., Clinical Professor of Pediatrics, Medical Department of Washington University, St. Louis, etc., etc. St. Louis: C. V. Mosby & Co., 1911.

LA SUGGESTION ET SES LIMITES par le PROF. BAJENOFF et le DOCTEUR OSSIPOFF. Paris: Bloud & Cie, 1911.

L'ANALYSE PHYSIOLOGIQUE DE LA PERCEPTION. Par EDOUARD ABRAMOWSKI, Chef du Laboratoire de Psycho-Physiologie de Varsovie. Paris: Bloud & Cie, 1911.

ARCHIVES OF PEDIATRICS

SEPTEMBER, 1911.

ROYAL STORRS HAYNES, PH.B., M.D.,

EDITOR.

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

THE REDUCTION OF INFANT MORTALITY.

With July and August behind us it is interesting to take a preliminary view of the results of this summer's campaign for the reduction of infant mortality in New York. The detailed figures are as yet not available, but such as are show a remarkable state of affairs. In the City of New York up to September 1, 1911, there were 10,399 deaths in infants under one year of age. During the same period in 1910 there were 11,440, a decrease of 1,041, or 9.09 per cent. over last year. At first glance this seems like a remarkable showing, and further investigation only makes it more remarkable, for up to September 1st there was a decrease of 1,233 deaths under one year, or 10.6 per cent. over the average for this period for 1906 to 1910. These figures, of

course, refer to the actual deaths and are not rates. No account is made of increase in population. This is the lowest total since 1904 for the city.

This would seem to be pretty definite proof that the methods employed this year in New York City have been more efficient than in years past. Certainly there has been a most encouraging coöperation between private organizations and the Public Health authorities. This fact alone, apart from results, is a cause for congratulation, but when we analyze these figures still further other points are brought out which strengthen the cause of the Milk Station movement very strongly. The Department of Health and the Committee for the Reduction of Infant Mortality of the New York Milk Committee started their campaign the latter part of May. On June 1st the deaths under one year in the city were 54 more than last year. This means that since the first of June there has been a saving of 1,095 lives as compared with 1910, or 20.31 per cent.

The activities of the Health Department, the New York Milk Committee, the Diet Kitchen Association, and the other members of the Association for Infant Milk Depots have been confined to the boroughs of Manhattan and Brooklyn. In these two boroughs during the months of June, July and August there were 1,030 less deaths this year than last, also a slightly greater reduction over the average for the last five years. In the boroughs of Queens and Richmond there has also been a diminution in the number of deaths under one year, but here we are dealing with very small totals and a comparison is not fair. Conditions in these boroughs also differ very greatly from those in Manhattan, Brooklyn and the Bronx. In the latter borough there has been an increase this year over last.

Comparing New York results with those of other cities throughout the country, so far as figures are available at this time, it is noted that in many cities there is a very distinct reduction in the infant mortality, but it will also be noted that this is not constant, and that the cities showing a marked diminution

are chiefly those which have been carrying on an aggressive campaign for this purpose. Others which have not awakened to their responsibility in this matter to such an extent show small decreases or increases.

This brief preliminary statement of results up to date emphasizes several points. The country has been through a season of excessive heat. The rainfall during the hot weather was scanty. Both these conditions are supposed to have an important bearing upon the infant death rate, and yet, wherever efforts have been made, the death rate has constantly fallen. It would seem that a further thorough, detailed study of weather conditions and their relation to infant mortality is needed.

Another point that comparative mortality statistics show is an upward tendency during recent years of the mortality figures during the cold months as compared with the tendency downward during the hot months. This would seem to indicate that this problem is not entirely a seasonal one. The campaign in New York this summer has been one of education to the mothers in the care of their children and prevention of disease. It would be the part of wisdom and true economy to continue this campaign the year round. This we believe is the programme of the Health Department, with the New York Milk Committee throwing all its influence toward the same end. The New York Milk Committee has at the present time about 5,000 babies under actual supervision, and the Health Department also has a very large number—just how many has not been stated. With the mothers of these children started in the right direction it would be almost a calamity if they were deprived of advice and instruction when the warm weather is over. The Health Department and the New York Milk Committee are still working as hard as ever, and it is to be hoped that the city will seize its opportunity to provide sufficient funds to carry on this work throughout the year with a full force,

ORIGINAL COMMUNICATIONS.

A READY METHOD OF CALCULATING MILK FORMULAS OF VARIOUS PERCENTAGES AND THE CALORIC VALUE OF THE SAME.*

BY L. EMMETT HOLT, M.D., LL.D.,

New York.

It seems hazardous at the present day to attempt to say anything new regarding methods of calculating milk percentages. The one which is here presented has, however, proved so easy of application and so easily grasped by medical students that its publication seems justifiable, especially since it is combined with a simple method of calculating the caloric value of the food when that is desired.

The more recent experience in infant feeding has shown the great practical advantages of using at times milk mixtures containing relatively low fat and high protein, and the need of some ready method of calculating such formulas with approximate accuracy has been felt. The use of top milks containing various percentages of fat made it easy to secure formulas containing higher fat than protein and also to increase the fat without raising the protein. The utility of such formulas has by no means ceased; but they need to be supplemented by others in which the percentage of fat is lower than that of the protein, and in which also the percentage of protein can readily change while the fat remains the same.

Starting with the belief that in practice it is unnecessary that the percentage of fat should ever be more than twice that of the protein, it has been found easy to construct a table by which a series of formulas can be obtained in which the fat may be as high as twice the protein, and as low as only a little more than one-fourth the protein, with all the variations between these extreme limits. The gradational differences given in the table have been found sufficient for practical work, but smaller gradations can readily be secured if desired.

The first step is to secure milks which contain different fat percentages: 7 per cent. of fat, 6 per cent., 5, 4, 3, 2 and 1 per cent. How this is done from one quart bottle of milk which has

* Read at the Annual Meeting of the American Pediatric Society, Lake Mohonk, June 1, 1911.

4 per cent. of fat, and one which has 5 per cent. of fat is shown in the following table:

		From 4% Milk.....				From 5% Milk			
To obtain 7% milk use	upper 16 oz.					upper 20 oz.			
" " 6% " " "	20 "					24 oz.			
" " 5% " " "	24 "					all			
" " 4% " " "	all.....					remainder after skimming off 2 oz.			
" " 3% " " "	remainder after skimming off 2 oz.					" " " " 3 "			
" " 2% " " "	" " " " 4 "					" " " " 5 "			
" " 1% " " "	" " " " 8 "					" " " " 8 "			

These figures are of course only approximate but repeated tests have shown the variations to be but slight from these averages.

Every ounce of 7 per cent. milk in a 20 ounce mixture will add $\frac{1}{20}$ of 7 per cent. or .35 per cent. of fat; every ounce of 6 per cent. milk will add .30 fat; every ounce of 5 per cent. milk will add .25 fat, etc.

Every ounce of each of these milks will also carry with it .175 per cent. of protein and .225 of sugar.

In the following table are shown the percentages of fat, sugar and protein of the different formulas which are obtained when one or more ounces of each of these milks (7, 6, 5, 4, etc.) are used in a 20 ounce mixture of food.

		A 7% Milk	B 6%	C 5%	D 4%	E 3%	F 2%	G 1%		Per cent.		Per. cent
I	1 ounce in 20 has Fat	0.35	0.30	0.25	0.20	0.15	0.10	0.05	with Protein	0.175	Sugar	0.225
II	2 ounces " " "	0.70	0.60	0.50	0.40	0.30	0.20	0.10	" "	0.35	" "	0.45
III	3 " " " "	1.05	0.90	0.75	0.60	0.45	0.30	0.15	" "	0.50	" "	0.65
IV	4 " " " "	1.40	1.20	1.00	0.80	0.60	0.40	0.20	" "	0.70	" "	0.90
V	5 " " " "	1.75	1.50	1.25	1.00	0.75	0.50	0.25	" "	0.85	" "	1.10
VI	6 " " " "	2.10	1.80	1.50	1.20	0.90	0.60	0.30	" "	1.05	" "	1.35
VII	7 " " " "	2.45	2.10	1.75	1.40	1.05	0.70	0.35	" "	1.20	" "	1.55
VIII	8 " " " "	2.80	2.40	2.00	1.60	1.20	0.80	0.40	" "	1.40	" "	1.80
IX	9 " " " "	3.05	2.70	2.25	1.80	1.35	0.90	0.45	" "	1.60	" "	2.00
X	10 " " " "	3.50	3.00	2.50	2.00	1.50	1.00	0.50	" "	1.75	" "	2.25
XI	11 " " " "	3.80	3.30	2.75	2.20	1.65	1.10	0.55	" "	1.90	" "	2.45
XII	12 " " " "	—	3.60	3.00	2.40	1.80	1.20	0.60	" "	2.10	" "	2.70
XIII	13 " " " "	—	3.90	3.25	2.60	1.95	1.30	0.65	" "	2.25	" "	2.90
XIV	14 " " " "	—	—	3.50	2.80	2.10	1.40	0.70	" "	2.40	" "	3.15
XV	15 " " " "	—	—	—	3.00	2.25	1.50	0.75	" "	2.60	" "	3.35

Let us suppose the patient to be a young infant and .70 per cent of protein to be proper. To secure this per cent. of protein, 4 ounces of milk in 20 ounces of food will be required. If this 4 ounces is of 7 per cent. milk the food will have 1.40 per cent. of fat; if it is 6 per cent. milk the food will have 1.20 fat; if 5 per cent. 1.00, etc. Let us assume the first mentioned, that 1.40 per cent. is desired. If we wish to raise both the fat and the protein proportionally the next increase would be to use 5 ounces of 7 per cent. milk in 20 ounces of food; later 6 ounces in 20; 7 ounces in 20, etc.

Assuming, however, that we wish to raise the protein above .70 but without increasing the fat, this can be done by using 1 ounce more of milk in 20, but of the series containing the next lower fat, *e.g.*, 5 ounces of 6 per cent.; 6 ounces of 5 per cent.; 7 ounces of 4 per cent., and 9 ounces of 3 per cent., all give approximately the same fat while the protein is raised successively from .70 to .85, 1.05, 1.20 and 1.60 per cent. Roughly, instead of following the columns of the table vertically from above we follow them obliquely.

In calculating the sugar percentage it is necessary only to see how much must be added to that already in the milk to bring it up to the percentage desired, remembering that

1 ounce milk sugar by weight in 20 ounce mixture adds	5	per cent.
1 ounce milk sugar by volume in 20 ounce mixture adds about	3	per cent.
1 even tablespoonful in 20 ounce mixture adds	1.75	per cent.

When more than 20 ounces of food is to be made up one should add for 25 ounces one-quarter more of each ingredient; for 30 ounces one-half more; for 40 ounces twice as much, etc.

The next table gives the caloric value of 1 ounce of each of the percentage milks used in the table and also that of milk sugar, barley and other things one may desire to add to the food formula.

CALORIC VALUES.

I	ounce	7	per cent.	milk	.....	27.5
I	"	6	"	"	.....	25.0
I	"	5	"	"	.....	22.5
I	"	4	"	"	.....	20.0
I	"	3	"	"	.....	17.5
I	"	2	"	"	.....	15.0

I	"	I	"	"	"	.....	12.5
I	"	fat-free	"	.....			10.0
I	"	whey	.....				10.0
I	"	milk sugar by weight	.....				116.0
I	"	"	"	"	volume	.....	72.0
I	even	tablespoonful of milk sugar	.....				44.0
I	ounce	barley flour by weight	.....				100.0
I	"	barley water (I tablespoonful to a					
		pint)	.....				2.0
I	"	malt soup extract	.....				80.0
I	"	condensed milk	.....				132.0
I	"	olive oil by volume	.....				245.0

In order to calculate the caloric value of the food quickly it is only necessary to note the number of ounces of the milk used in the formula, multiply this by the caloric value of 1 ounce, and add the caloric value of the sugar or barley used in the formula, *e.g.*, for 40 ounces of the following formula:—

				There will be required	
Fat	.....	3.50	per cent.	7 per cent. milk	20 ounces
Sugar	.....	6.00	" "	Sugar	2 $\frac{1}{8}$ tablespoonfuls
Protein	....	1.75	" "	Lime water	2 ounces
Lime water	.	5.00	" "	Barley water	18 "
Barley water diluent					

Caloric value:—

Milk	20	×	27.5	=	555
Sugar	2 $\frac{1}{8}$	×	44.	=	93
Barley water	18	×	2.	=	36

Total in food	684
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While a knowledge of the caloric value of the food is not of great practical assistance in the problems of infant feeding it is sometimes useful in determining whether the food given is very much above or very much below the theoretical requirements.

HOSPITALS FOR THE CARE OF INFANTS AND CHILDREN AND THE METHODS OF PREVENTION OF INFECTION.*

BY HENRY KOPLIK, M.D.,

New York.

One of the most interesting questions concerning the hospital care of infants and children is that of the prevention of infections. Infections sometimes insignificant at first may subsequently lead to the death of the individual. We know that the age is of great moment in considering this question. Mild infections at birth or in early infancy receive great consideration at the hands of those to whose care we look for the avoidance of these accidents. In hospitals which house infants and children, the question of the separation of the infants of tender age from older children is an important one for various reasons, the chief one being that the attention is centered more intensely on the care of the infant in a service which is devoted exclusively to their care than in one in which infants and older children are grouped in the same ward. In certain institutions, such as those of Keller in Berlin, the Augusta Victoria Haus, the whole hospital is devoted to the care not only of premature infants but infants under two years of age. I mention this institution of Professor Keller because it is of most recent construction, well-equipped, and probably the finest institution in the world devoted exclusively to the care of infants below the age of two years. Another institution similar in nature, but not at all to be compared to it in perfection of detail, is that of Finkelstein in Berlin. It is not as modern in construction, and is a species of asylum or house in which infants supposedly orphans are received. They are kept in it a short time, and then discharged into care outside the institution. These two institutions, so-called asylums, are devoted to the care or bringing up of young infants or nurslings. They may fairly be compared, the one most recent, and the other of not so recent date. In one institution, that of Keller, every detail known to modern

* Read at the Annual Meeting of the American Pediatric Society, Lake Mohonk, June 1, 1911.

science in the care of the premature and young infants has been drawn upon to make the uniform whole. The wards are bright, the light streams into them and seems to come from all sides. The cribs are far apart, the clothing and linens immaculate, and the little charges look well. The ventilation is perfect; no odor of any kind is perceptible when one comes into the ward. The nursing personnel is of the higher type. In this institution infections are rare. In two years they have had only one case of vaginitis, and this came into the house. Furunculosis is also extremely uncommon. There has been only one epidemic, if it can so be called, that is, three or four prematures developed a pertussis-like cough, but the infection was quickly controlled. I saw no infants with head sores or infectious ulcerations which had developed in the house. The whole tone of the ward was that of cleanliness, painstaking and apparent.

The result of all this care is a homogenous whole, simple and complete, with results in keeping. Here, the much vaunted box is unnecessary, the individual isolation of one little patient from another is accomplished through intelligent coöperation and an exceedingly intelligent and conscientious nursing *personnel*. I need not say, in view of all that has been said, that each infant has its thermometer, and other necessary utensils for its own use. Thus an infant who enters this institution does not become ill if well, and if ill there is no other infection contracted in the institution.

In this institution, we can at once understand the *raison d'être* of a special care of the infant. The other institutions, both new and old, which I have seen, do not impress one in this way. They are simply collections of infants, nothing more.

Infants are born in the house in the Keller institution as well as brought into the house from the outside. The mothers are cared for before confinement in a separate service in another part of the house, and do not obtrude themselves into the general institution. Here also, both in the care of the future mother and in her confinement, the most exquisite cleanliness is observed, but above all simplicity—none of the gaudy, showy confinement rooms seen elsewhere, especially in institutions bent on being up-to-date.

An institution devoted to the care of infants can never be complete without looking to their care when discharged from the

institution, and this is done in a separate department, which, by the by, is the case in another institution, the Finkelstein Asylum, devoted to the care of infants exclusively. That is, there is a department of "sauglings fürzorge" (child welfare). This is a separate department. We have something similar to it in New York in the welfare department connected with some of our institutions, but only in a fitful, non-methodical way, scarcely deserving comparison to what is seen in Keller's institution and in others in Germany.

To return to the subject of infections and the *raison d'être* of the institution for the care of infants exclusively. From what has been said, the casual observer cannot but be impressed that the best results can only be accomplished in this way. On the other hand, it must not and cannot be maintained as to the scientific care of the infant that it is, as some would have us accept, something mysterious or requiring on the part of the physician a special training outside of the lines we have indicated, in other words, the care of the infant as seen in these institutions is not a full specialty of pediatrics. This would be an absurd contention to my mind and not at all granted by anyone with whom I have spoken. The institutions devoted to the care of the infant simply carry out details long known to us, but impossible in institutions where services are of a mixed character.

The Box System.—The box system of construction in wards of hospitals reaches its highest development in the hospitals of Paris and France. The origin of the box is a matter of interest and must have been due to an effort to diminish the chances of infection of one patient by the other. Of course the box alone would not do this, but with the box there go certain precautions which in themselves would, if carried out, reduce the chances of infection and thereby mortality. The hospitals of older construction and the old wards in Paris hospitals for the care of infants and children, even on a casual inspection, demonstrate why a decided effort was made to reduce infection and thereby mortality. Without entering into an unnecessary analysis of the construction of the old hospitals, it is enough to say that with the appearance of the box the conditions have remarkably improved, but whether this is an argument in favor of the box system or the greater asepsis and isolation exercised, is another question. We have in the French hospitals devoted to the care of infants and children

several varieties of box construction. Beginning with the old hospitals, such as that of the Hospital des Enfants Malades, boxes were constructed in the old wards and those in the newer pavilions which are almost ten years old. In the old wards of Hutinel the box is a small room about eight feet by ten, the partitions reaching to the ceiling. The construction is of glass and wood and the box is entered by a door which is supposedly always closed. There are four or six such boxes in a ward. The box really is a room with a window leading externally, plenty of light and sun and ventilation coming through the window. In these boxes there may be two or three children; they may have the same affection or different affections; they are of the non-contagious type. The patient is placed in this box room when admitted to the ward, so as to guard against infection of other patients in the ward should a case recently admitted develop measles or scarlet fever. In other words, these boxes may be utilized and are utilized as a species of reception ward. Outside the boxes there are the regular ward patients, suffering from non-contagious diseases. The nurse as she enters the box is supposed to exercise certain precautions, even though the patient may not suffer from any communicable affection. She has a gown to be put on when she is in the box; the gown hangs on a peg inside the box. The patients in the box have utensils such as thermometers and pans for their special use. In this way certain definite precautions can be carried out as to cleanliness and asepsis. This is the most primitive form of box system in the old wards. In other wards, the boxes may be more numerous, but they all have about the same form and are seen at one end of a ward. In the new pavilions devoted to the care of measles, scarlet fever, diphtheria, the more recent construction of box is seen. The construction in the pavilion devoted to measles is that of steel and glass partitions which extend along the side of the ward. The partitions are situated as a rule between the windows; they do not reach to the ceilings, and project out into the ward for a distance of six or eight feet, leaving a central corridor running through the wards from one end to the other. Thus in this system the top and the front of the box are open and the arrangement is that seen in an old English inn, where recesses divide up a central room. The partitions being lightly constructed of steel and heavy plate glass, there is no obstruction to the circulation of air or light. In each

one of these recesses there is a bed. At both ends of the ward are rooms constructed in the shape of boxes, the partitions reaching to the ceiling, and entered by means of a door. In these glass rooms or boxes are placed complicated cases, such as measles and bronchopneumonia. In each box there is a gown for the nurse, basin, thermometer and necessary utensils for the use of the inhabitant of the box. It should be remembered that the top and front of these boxes are open, therefore later on in discussing the mode of propagation of infections it will be seen that in such a box the question of infection through the atmosphere has not been entertained. All the cases are cases of measles. If there happen to be mixed cases, such as diphtheria and measles or measles and bronchopneumonia, they are placed in closed boxes, possibly in the same ward, as indicated at either end of the ward. In the pavilion devoted to scarlet fever, much the same form of box exists. In the diphtheria pavilion, however, there is the closed form of box, that is, a ward along the sides contains ten or twelve rooms, the partitions reaching to the ceiling constructed of steel and glass air-tight; there is a window in most of the boxes leading to the open. The ventilation is further provided for by flues in the ceiling; the box is closed with a glass door and in the center of the ward is a large corridor. Thus passing along the corridor, everything in the box is visible from almost any part of the whole ward. One or two or even three patients may be in a box; if small infants, generally two are seen in a box. In the diphtheria pavilion the closed box is adopted with a view to flooding the box if necessary with vapor of steam or chemicals. The history of the patient and his progress are posted outside the box in the main corridor of the ward. Thus the physician may not enter the box unless called upon to do so. In the box there is the gown for the nurse and the individual utensils of the patient. In this form of construction, which is the most perfect and expensive, a thought was evidently given to the possibility of air as well as contact infection. It is evident, however, that if the primary idea was the separation of one patient from the other, this has given way to the idea of separation of the patients in groups of two or three, so that if an epidemic of mixed infection did occur, it could be most easily held in check in this system as well as the system of one patient to a box only. Tube cases are generally separated in box rooms at the

end of the ward. I saw two and three tube cases in a box. So that even here the individual separation did not obtain except that in this large box room there are found low glass partitions between the beds on one side of the room and not on the other.

The Herold Hospital in Paris is devoted entirely to the treatment of sick infants and children. In this hospital the box system is general and the wards are constructed on this plan. Even in the pavilions devoted to the care of patients with general internal non-infectious diseases the box system is in vogue. The boxes are of recent and older construction. In the same wards the boxes are open at the top and extend from the floor to about eight feet above, and are made of sash wood and glass and provided with doors. In some services, such as that of Barbier, these doors may remain open, in others, such as Lasage, they must be closed and kept closed. The boxes are aligned along the sides of the ward and in the center there is a broad corridor. Walking through this corridor, everything in the box is evident. There may be one or two or even three patients in a box. The diseases are mixed and there may be a bronchitis and chorea in one box or with it an enteritis. Each box is provided with a gown for the nurse and the patient's utensils, including thermometer, are provided.

In the pavilion devoted to the treatment of diphtheria the box is closed at the top, reaching to the ceiling and provided with a system of ventilation. In some wards, such as that of Lasage, infectious and communicable diseases such as scarlet fever may be seen in one box and next door chorea and bronchitis or tuberculosis, and these particular boxes I have seen are open at the top and there is free circulation of air from the box into the ward. I understand that Lasage rarely touches a patient and only goes into the box on general rounds if some special occasion arises, not otherwise. Another noteworthy arrangement is that very young patients are found side by side in the same box with older children; there is no arrangement as to age. Each ward houses upwards of thirty patients and there are somewhere near to two hundred and fifty in the hospital. In this hospital the tuberculosis cases are housed in pavilions apart from others, and are also put in boxes. They are treated also during the day in the open.

The highest development and application of the box system

is seen in the Pasteur Hospital. This is of recent construction, and the whole hospital is on the box plan and is in direct touch with the Pasteur Institute with its laboratories. There are several pavilions, each two stories in height. Inside, the ward is divided into a series of large glass and steel rooms. The walls of these rooms extend to the ceiling; they are of light steel and plate glass construction. Each box or room is closed air-tight by a door, and the ventilation of the room is accomplished by means of air shafts in the ceiling and windows leading to the open. The sun and air reach all portions of the pavilion. All the boxes open into a broad corridor, and from this corridor everything is visible to the observer. Passing along the corridor one can at a glance take in the situation in any given box. Here is seen a complete mixed service. The exanthemata and infectious diseases are seen in one box, and in another box are seen the diseases of a non-communicable nature. The doors of the boxes are kept strictly closed. The patients are of all ages and, as remarked, there is a general mixed service. Of course, we do not find in the box of a scarlet fever patient anything but that disease; the same with diphtheria. Here I also saw in boxes three cases of the sleeping sickness; one in a child who occupied a box with another child who had another affection.

What impresses one in the Pasteur Hospital is that in the development of the box system there has been a sacrifice to an orderly arrangement of diseases and patients.

Returning to Germany, we find the box system adopted in the newly constructed hospital of Heubner in the Charité. Here the open partition of steel and glass has been adopted in one of the wards and this is called the box ward. The partitions extend up to the height of about six feet from the ground, are constructed of steel and glass and open without doors into the center of the ward, which is free and clear. Each boxed, partitioned space contains a bed and the most diverse non-contagious diseases are housed here—tuberculosis, enteritis, chorea. Each so-called box extends out into the ward about six feet. There is thus free circulation of air and plenty of sunlight; some of the little patients, if able to be up, may come out of the box and play in the corridor at the opening of the box. Each box is provided with a gown which the nurse is supposed to don when she enters the box. Each child is provided with separate utensils; the ages are

mixed. There are other wards in this new hospital devoted to young infants, and these as well as the wards which contain older children are constructed without boxes. I understand a new box ward is being constructed to house the exanthemata.

Discussion.—The box system may be looked at from several angles of view and the impression on the whole is not satisfactory until one has visited a new institution like that of Keller, in which no boxes exist and in which infections are exceedingly rare. Thus the first definite point that seems to be fixed in my mind from the start is, that given good conscientious nursing and care in detail, the box system is unnecessary in a *non-contagious* service to the extent which I shall point out. The primary object of the box has been to avoid *mixed* infections. Some clinicians wish as Barbier to avoid principally contact infection, and others such as Lasage lay considerable stress on the atmosphere about the patient as a carrier, as well as the contact infection. As a matter of fact, after a close study of the box system, we can conclude that it is a potent barrier to contact infection and also to infection in the immediate vicinity of the patient, that is, in a tracheal diphtheria, the expectorated masses never reach the next box and patient, and this alone is a vast gain, preventing as it does, not only mixed infection, but the reinfection of patients. On the other hand, in a ward such as the Lasage ward, in which the boxes are open at the top, we would look for a very potent argument against the so-called atmospheric mode of infection. I understand that an infection of a patient with scarlet fever is rare, though they may be in the next box, and at the same time this fact is a strong endorsement of the nursing in this particular ward where patients are handled very rarely except by the nurses and in which the lack of contact infection is distinctly evident. Therefore, if the infectious diseases can be practically treated in the same ward in the manner indicated, we certainly in the past have overestimated the importance of the agency of the atmosphere in carrying infections. Has the box system diminished the chances of infection? It certainly has in France by inculcating the importance of attention to detail, but behind this we feel that in wards in which non-contagious diseases are treated the box is an unnecessary institution if the nursing and attention to individual isolation of the patient as practiced in the wards of the Keller institution and the Mount Sinai children's wards are carried out. In

medical non-contagious wards only do I see the superfluity of the box. In surgical children's wards, I should think the box would be a boon in emphasizing the isolation of one child from the other on account of the possibility of pus from one patient reaching the neighboring bed, or the possibility of treating with the aid of the box erysipelatous and infectious gangrenous conditions in the wards. In surgical wards it is my experience that the exanthemata are apt to break in on the service because assistants and nurses are not alert enough in detail of individual isolation of patients as in medical services. In such wards simple partitions such as are seen in the Heubner box ward would serve all purposes of isolation, and would not interfere with light and air. I think a close study of the box system would in purely medical non-contagious services reject it as a universal necessity. It may be of use in the sense that the Hutinel employs it in the ward as a temporary reception ward, either for doubtful cases or those children who as yet have not had the exanthemata. In the treatment of exanthemata, diphtheria and measles, as also small-pox, the box not only is a means of cleanliness but preventive of reinfection, and mixed infections as noted above. One can only reach this conclusion by a survey of recently constructed institutions as those in New York in which diphtheria and the exanthemata are treated in general wards, and those in Paris in which the children are separated in groups in boxes. The latter system is certainly more cleanly and leads to better results in the absence of mixed infections.

The Acute Infectious Diseases.—A study of the box system in an institution such as the Hopital Pasteur and then a close analysis of the results as published in the recent report of Dr. Martin, leads to the inevitable conclusion that in this hospital they certainly have solved one of the most important questions in connection with the treatment of these diseases, namely, the prevention of the mixed infections. Especially interesting are the results obtained in the management of the cases of scarlet fever, measles, diphtheria and varicella. The mortality in these diseases for a period of ten years, allowing for varying severity of epidemics, is not only low but remarkably lower than that of any other similar number of cases in other hospitals of Paris or France, and more especially is this low mortality rate noticeable in infants and children below the age of two years. When

compared to the mortality rate in hospitals in which the children are treated in the old way in hospital wards even in France, the conclusion is that in the Pasteur Hospital, even if some of the old ideas and new ones also for that matter as to the arrangement of patients as to age are roughly set aside, the results are convincingly in support of the contention that the system of individual isolation is the only and correct one to follow in the future management of these diseases. I speak only of the exanthemata and diphtheria cases. In the Hopital Pasteur mixed infection and reinfection is reduced to a minimum and rare. Not only is this so, but there is a feeling that the crowding together of 40 or 50 cases of scarlet and measles in one open ward not only is a potent factor in causing uncontrollable mixed infection, but is one of the chief sources from whence flows an increased mortality. In the old system even if the nursing is beyond criticism, it is hard to see how one can avoid carrying infection from one child to another, especially when beds are close to one another with children coughing and expectorating, nurses passing from one to another, sometimes washing the hands, at others not doing so. Hence the mortality rate cannot begin to compare to what is seen in the Hopital Pasteur. I have described the system of box isolation constructed here, but have not mentioned that daily there is a complete sterilization of eating and other utensils used by patients, so that every day brings practically a sterile set of apparatus to the patient's bedside. Vigilance is ever present to carry out details of nursing and treatment, and at the same time there is not such a superfluity of nurses as to be noticeable. It should be kept in mind that all the exanthemata are treated in the ward where contagious maladies are housed, and though not in the same box, a scarlet may be in one box and measles in the next, and still no transmission occurs to any appreciable degree. In ten years the number of infections in the hospital proper were 30 in an aggregation of 9,677 patients. Most of the infections in the house could be accounted for by an infringement of the rules laid down for the management of the patients and boxes. An amusing example is as follows: In order to entertain some children convalescents from scarlet and measles a phonograph was placed in the corridor; the children could not well hear the music, so that the sisters opened the doors of the boxes to allow the children to see and hear. When the backs of the nurses were turned

the little ones escaped into the corridor, mingled with each other, and in fourteen days they contracted measles. "Now the doors of the boxes are kept closed when the phonograph plays." Some of the methods are of note. All infants and children on entering receive an immunizing dose of diphtheria antitoxin no matter what their malady. Taking scarlet fever, the mortality below two years of age in 71 cases is 8.4 per cent.; from two to fourteen years in 708 cases 0.9 per cent. Certainly this is striking and nothing short of astonishing. Measles, 245 cases below two years of age, give a mortality of only 9.8 per cent.; 260 cases from two to fourteen years a mortality of 1.1 per cent. Diphtheria, 309 cases from 0 to two years, give a mortality of 20 per cent.; 437 cases from two to fourteen years of age give a mortality of only 6 per cent. I know of no such favorable statistics or anything like them elsewhere. Dr. Martin has compared his statistics with similar statistics of an equal number of cases in other hospitals in France, where patients are treated in open wards, and without saying much as to such comparisons and allowing for all sources of difference, the comparison leads to only one conclusion, and that is that there is only one method of treating the infectious exanthemata, and that is in the box system. The old system of general wards, even with isolation rooms, is a system of the past. Not only is this true in considering the mortality rates, but what is vastly more of scientific interest and importance, the avoidance of the mixed infections. Even in hospitals and wards where non-contagious diseases are treated, if there should arise a case of measles or scarlet fever its isolation in an outside box is preferable for many reasons to its transfer to an isolation ward, where the case passes from control of the attending physician to the hands of another, and the patient suffers. It would seem that the maintenance of separate isolation wards is an extra drag on the service, and though it is a spiritual comfort to banish a case of measles to where not a soul can get it, except those in the isolation ward, the Pasteur system proves to my mind that this is a needless procedure. Moreover, it must not be forgotten that in the Pasteur system special nurses do not care for the exanthemata, but the same nurse, after the precaution of changing her gown in the box and washing her hands, passes from a child with a contagious to one with a non-contagious disease. In the face of this, some of my experiences in the past and some of the criti-

cisms to which my views have been subjected seem certainly amusing. In constructing children's wards to-day it would be wise to have, in connection with such a service where general non-contagious diseases are treated, several boxes for the immediate isolation of cases of measles or scarlet fever which might break out in the service. They could be so constructed as not to interfere with the general ward, but be placed outside of it. In this way the early isolation would tend to prevent epidemics and also the cases would remain under the same attending service and observation. In a way this has been done both in the medical and surgical services of the Mount Sinai Hospital without any appreciable ill effects. Cases of varicella, diphtheria and scarlet fever have been placed for varying periods in rooms outside the general wards, where some special reason made it unwise to lose sight of the patient. But here a special nurse was placed in charge. Whether in the future we shall in other institutions follow this system or that of the Pasteur Hospital will be a matter of scientific interest. A study of the Pasteur system also is a convincing argument against the potency of atmospheric infection. What amusing and annoying blunders and injustice have been committed in the name of the atmospheric infection theory, the life work of every sincere man will show. There was a time not long over a decade when wiseacres shook their heads when the primary importance of contact infection was a matter of discussion. Even to-day and in Paris, not far from the Pasteur, there are those who will not entirely allow the absurdity of some of the old propositions as to the agency of atmospheric contagion. In America we can see that the times are still with the atmospheric as well as the contact theory, and while admitting the importance of contact infection, the mysterious fetich of atmospheric agencies certainly holds in fetter those whose influence counts for something.

MILD SCARLET FEVER FOLLOWED BY A FATAL RELAPSE.—Nicolas (*Arch. de méd. et de Pharm. Milit.*, 1910, Vol. LV., p. 103). A young soldier had a mild attack of scarlet fever. The temperature became normal on the fifth day, and he was allowed up on the twenty-fifth day. Three days later, while the hands and feet were desquamating, a relapse occurred with all the symptoms of scarlatina anginosa. Death took place on the thirtieth day of the relapse.—J. D. ROLLESTON.—*British Journal of Children's Diseases.*

WARD IMPROVEMENTS; CRIB WARMER; MANAGEMENT OF "CARRIERS"; PREVENTION OF EPIDEMICS; CHILDREN'S SERVICE, PRESBYTERIAN HOSPITAL.*

BY W. P. NORTHRUP, M.D.,
New York.

How may we avoid receiving into a ward not only cases just developing communicable diseases, but how protect the wards from cases exposed and not yet showing symptoms, how in short may we strain out from the inflowing current of applicants and emergency cases those individuals who within a few days may disseminate the germs of an epidemic? Granted that we are not at present very hopeful of complete success, it remains to consider how we may improve our methods to the end that we may keep the children's wards out of quarantine more and more.

At the Presbyterian Hospital we have had the service closed time and time again by measles and other communicable diseases. We have had the usual experience with vaginitis, diphtheria-carriers, and desquamation of unknown origin. From these experiences we have learned something.

Entrance Examination.—There are several ways of entrance to the service—by examination at the front door by an interne deputed for the week; by the dispensary physician, children's class, each case approved by the house physician; and by an ambulance in emergency service. Emergency cases requiring immediate hospital attention, such as operation, are received and taken care of whatever associated germs they may carry. As a last resort there is always the isolation pavilion. By the regulations here described we have increased the efficiency of the service, allowing the wards to run fuller and diminishing quarantine closures.

FRONT DOOR EXAMINATION OF APPLICANTS.

The examination room is provided with the usual facilities of examination, including culture tubes, plus this card, which explains itself.

* Read at the Annual Meeting of the American Pediatric Society, Lake Mohonk, June 1, 1911.

ADMISSION CARD.

(CHILDREN.)

Name Age

Address

What contagious diseases has the child had?

.....

What contagious diseases are prevailing in the child's immediate family and vicinity?

(For further information call Col. 4900, Contagious Disease Dept., Dept. of Health.)

.....

Does the child present any evidence of contagious disease?

.....

Examining Physician.

Date.....19

48-3M-59.

[OVER.]

In order to stimulate the memory of the routine examiner, he is asked to refer to the other side of the card and also to sign his name. This card accompanies the history until the patient is discharged.

[Reverse.]

No contagious diseases are admitted to the Hospital.

Patients free of contagious disease may be admitted to the Observation Ward.

Patients so seriously injured or so seriously sick as to require admission to the Hospital in order to save life, even if complicated by a contagious disease, may on application to the Superintendent be admitted to the Isolation Pavilion.

The most common contagious diseases to be guarded against are:

Diphtheria	"No. 1	Dept. of Health"	} In reporting use numbers.
Scarlet Fever	"No. 2	" "	
Measles	"No. 3	" "	
Small-pox	"No. 4	" "	
Vulvo-Vaginitis			
Whooping Cough			
Ringworm			
Trachoma			
Mumps			

This method of observation serves very well in deliberate work. The mishaps arise from the ambulance cases, automobile accidents, for instance, when no delay is possible. These cases are detained in the accident ward till morning when feasible, or in some detention room awaiting a daylight examination, and are then sent to the observation ward with other entering cases.

Observation Ward.—All cases entering the children's service are detained here until the head physician of the ward is satisfied that no infectious disease is threatening. The ward consists of a main large room, two isolating rooms, and the necessary service rooms. The capacity is four beds, with the possibility of adding four more. The cases remain in this ward until passed upon by myself. It is impossible to divide the responsibility, one person visiting the ward every day must assume such responsibility. Culture are made from the nose and throat, and vagina smears are examined before the case is considered eligible for moving up into the ward. Of course the mucous and skin surfaces are most carefully examined in good daylight. The length of sojourn in the

observation ward depends upon the verdict of the responsible visiting physician. A boy suffering from pneumonia may be hurried through to the roof ward, while a girl without urgent symptoms may remain three days. Our cases are inspected in the morning in good daylight. I assume that with this audience it is unnecessary to dwell upon the details of individual precautions. Suffice it to say that we have separate enameled tables, containing individual necessities for each child—a complete outfit. The necessities for bathing are contained in this table—no tubing is allowed. After removing to the main ward the same individual precautions are preserved, the bathing now being done in the washing room, to be later described.

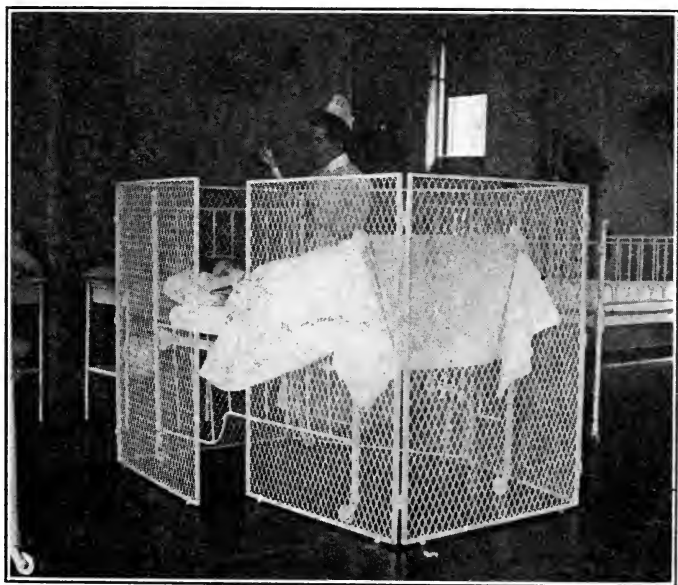


FIG. I.—Bed screen.

Fig. I. depicts a bed screen or "grille." This is designed to isolate within the ward "suspects," and all newly arrived patients are suspects.

We believe that, with few exceptions, diseases are communicated by contact or near approach of "carriers." The unexplained outcropping of contagious diseases is due to carriers, who do not suffer from the disease themselves and are not therefore suspected. The bed screens are placed around typhoid, influenza, bronchitis,

bronchopneumonia, whooping-cough, chicken-pox patients and "carriers" of diphtheria bacilli. With the space, the air currents, the *personnel* of nurses and internes which we now have, I believe the experiment is justified.

I wish to say that Dr. H. M. Biggs has personally visited the service and shared the responsibility of this experiment in the capacity of adviser and consultant.

After a whole winter's experience without accident and after

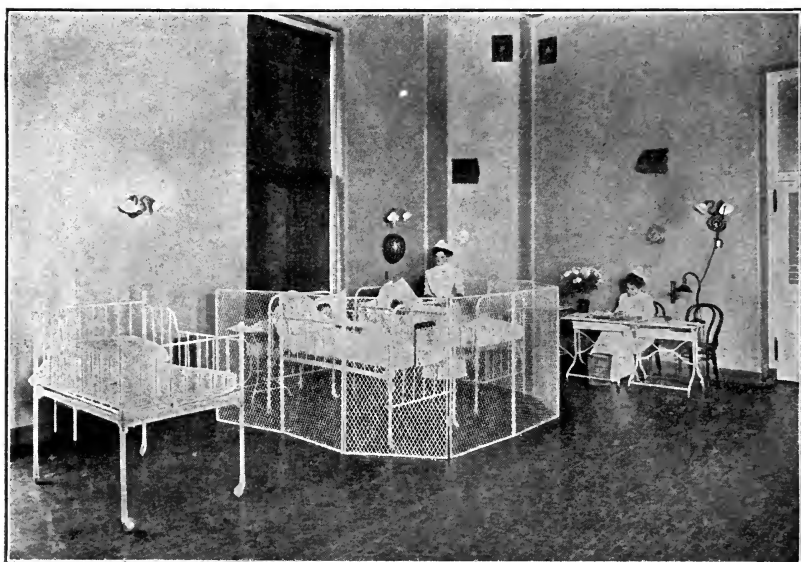


FIG. II.—Bed screen.

all the cases are well and restored to their homes, I feel that I may report the bare facts.

The screen keeps the children, the runabouts, from visiting within the carrying radius of coughing and sneezing—three to five feet. Transmission of disease germs is nearly always immediately from one warm, moist mucous surface to another, and rarely by quick mediate transmission ("fomites"). A screen sufficiently large to surround a bed consists of two units of three leaves each. Each leaf is four feet high, three feet wide and swung on two way hinges. In the most approved, latest screens the hinges are mounted on an upright standard after the manner of the usual fire screen. This mounting is strong, does not "wobble"—the upright bears the weight of the screens.

An ambulance case of empyema, appendicitis, or automobile accident, incidentally a carrier of diphtheria bacilli or gonococci, cannot be transferred to special hospitals without suffering from the lack of surgical treatment. We do not contend that there is no danger from the bacilli in the nose, but with a properly trained *personnel* and with the isolation which the screen affords, they can be safely treated in the ward. Immunizing doses of diphtheria antitoxin are usually administered to "runabout" children.

In this connection I wish to refer the reader to a recent publication of Dr. Alvah H. Doty, Quarantine Commissioner, "Prevention of Infectious Diseases." The fallacy of certain theories regarding the transmission of infectious diseases is here shown, and Dr. Doty's vast personal experience has corroborated the views here set down.

The illustrations show the essentials of construction. The screen units can be linked together indefinitely and sufficiently to surround an adult ward bed. We have found the screen an aid in keeping visitors from kissing patients to their entire satisfaction. No amount of rules or screens will keep mothers from kissing their babies in their mouths, but altogether we have had but one case of measles in the service during this winter's extensive epidemic and no second case from the one. We allow the nearest of kin to visit on regular visiting days. The ward has not been thrown out of function in three years.

The old-time tub has been discarded. In its place we have adopted the spray bath. Babies can be bathed in less than half the time, more comfortably to the nurse, and as for the baby, more agreeably and with vastly less danger from communicated infection and from burning by hot water.

The wards of the Presbyterian Hospital are usually cool, 60° to 65° F. in winter, and the bath-room must be comfortable, usually 70° to 75° F. This room, which we call the "grooming" room, is thoroughly heated, so that every surface, every fabric, the slab and water are all agreeably warm. The facilities offered in order to make this method popular must please everybody and be safe. Such it has proved, and no accident of burning has occurred, and it seems to be "fool proof."

The results of experience for three years justify us in assuring those interested that the danger of infection is greatly reduced. We have not known of any transmission. The infants are prac-

tically bathed in a running stream. Nothing is used a second time, except the bath towels in which the child lies. They are immediately thrown into boiling water, to be used once more on another day. This is to economize laundry work. The soap is liquid and shaken from a bottle, the powder is shaken from a box, the gauze wash rags are burned, towels are immediately boiled.

To fill a bath tub, secure the correct temperature, bathe the baby, empty the tub, clean it, disinfect it, refill it and secure the proper temperature requires time and a conscientious worker.

CHILDREN'S SERVICE.

DAILY REPORT TO THE ATTENDING PHYSICIAN OF WARD REGARDING INFECTIOUS DISEASES.

1. MEASLES—Skin eruptions, catarrhal symptoms, Koplik spots?
2. VULVO-VAGINITIS—Discharge, pus, redness, gluing together of labia, micro-organisms found?
3. DIPHTHERIA—Exudate, nasal discharge, bacilli found?
4. SCARLET FEVER—Skin eruptions, marked redness of throat, desquamation?
5. OTHER CONTAGIOUS DISEASES?

Are there any evidences of contagious diseases in the Ward?

Yes.	No.	.....	House Physician.
Yes.	No.	.....	House Surgeon, Div.
Yes.	No.	.....	House Surgeon, Div.

REMARKS—If there are evidences of contagious disease, mention the facts and the temporary disposal of the case.

Date.....19

*Description of Bath Facilities.**—Beginning above, one sees an 80-gallon tank; the water heated at will, usually to 103°F . The temperature is read off on the thermometer projecting from the left of the lower quarter. This tank is filled by the same nurse each day, the temperature noted by the head nurse and the hot and cold intake pipes shut off till further orders. This insures a constant temperature (103°F .) in the tank and about 100°F . as it runs from the spray. The water gauge shows on the face of

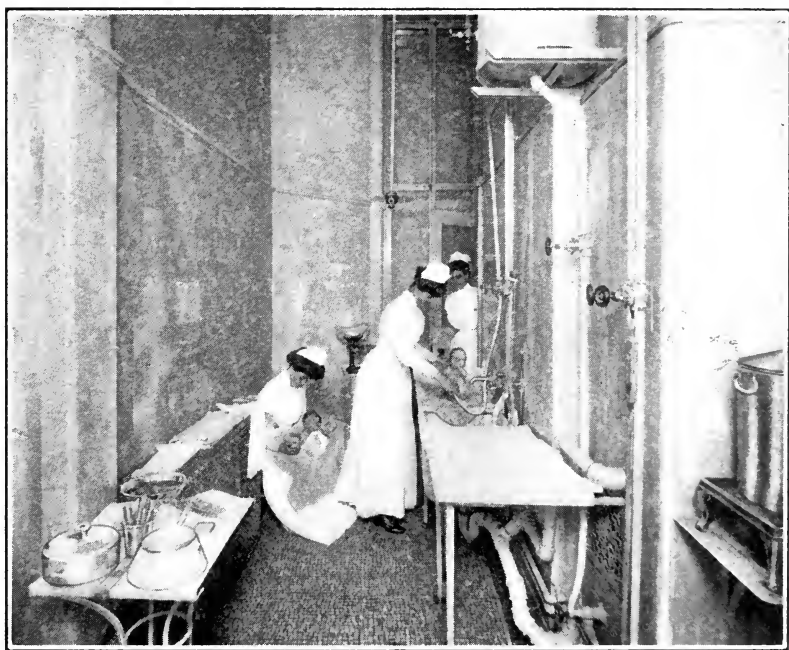


FIG. III.—Bathing of babies.

the tank. In this glass tube the amount of water in the reservoir can be easily noted. Mixing the hot and cold water is effected as follows: The hot and cold water pipes are turned on together while the filling and temperature are noted by the nurse deputized for this purpose. The hot and cold water pipes within the tank terminate in four points somewhat like a miniature gas-fixture, the hot-water tips pointing downward, the cold water pipes pointing upward. The current of the two streams goes against their gravity tendency and so interdigitates that a thorough inter-

* *Medical Record*, May 8, 1909.

mingling of currents is effected, and there can be no layers of hot and cold water. The contained water is of uniform temperature throughout. Eight gallons is found to be enough to serve for a morning's work. There are overflow pipes.

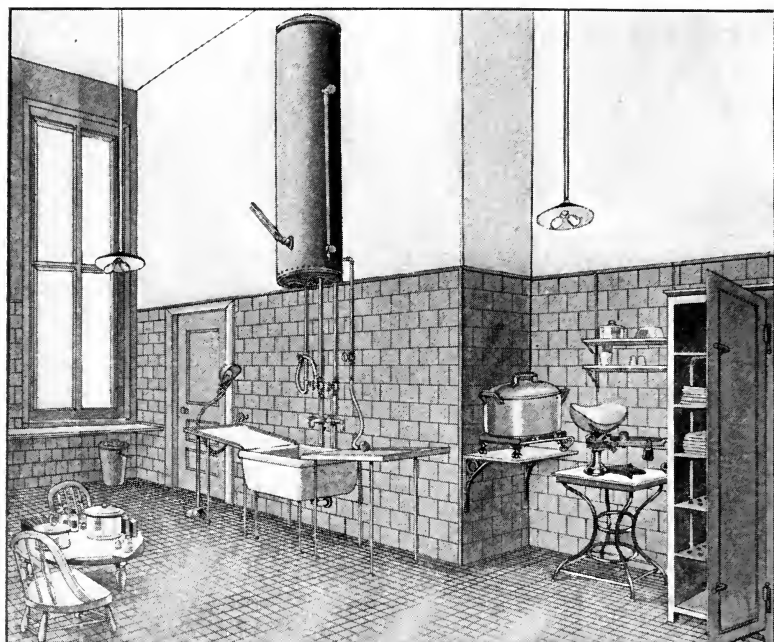


FIG. IV.—Bathing apparatus.

Below the tank are seen two flexible rubber pipes terminating in the usual metal bath spray tips. From these, it is designed that the water shall flow at 100°F. uniformly during the entire morning's work.

On the next lower level is seen a sink winged with two sloping marble slabs. These slabs are warm and upon them are laid individual bath towels and the baby. After each bath the towels are boiled.

To the extreme right is seen the hot closet from which the fresh clothing is taken dry and hot.

At the extreme left are seen the low nursery tables and chairs found convenient in dressing the children.

It is noted that a very large window lets in a flood of light, so that the slightest eruption or change of color or abnormal ap-

pearance of the mouth, tongue, or eyes can be easily detected. An electric reflector in addition to the overhead lights serves the same purpose at night. There are two doors, one leading to the corridor and one (that shown in the illustration) to the toilet.

Result.—After several months' use, the apparatus and general facilities of the room have proved satisfactory.

(1) The babies are washed in less than half the usual time.

(2) The babies seem to be more comfortable and happier during bathing. They seem thoroughly to enjoy the warm room and warm spray; they wriggle and gurgle and crow.

(3) Danger of infection from promiscuous tubbing is avoided.

(4) Mishaps from the use of over-hot water are thus far avoided, and it would seem that the chances are reduced to the minimum. As a general proposition one is painfully conscious that it is always possible for novitiates, excited individuals, mothers, and doctors, as well as nurses, to have mishaps, with unfortunate results, in the combination of baby and hot-water baths.

Results.—No new infections. No burns.

A baby with cold feet cannot digest, and a poorly nourished baby must have artificial heat until it can furnish its own. Hot-water bottles are expensive, troublesome and perilous. In using many hot bottles for an extended time accidents of burning are sure to occur. The apparatus here shown is believed to meet all the demands, correct all the faults and avoid all the perils here mentioned.

The electric crib warmer consists of a shallow asbestos box containing an electric heater; above this an asbestos trough in which rests the usual ward bassinet. Our first heater was made by the engineer from material he had "in the house," an ordinary electric foot warmer, asbestos boards, cable couplings and switch which allow the current to be regulated to "high," "low," "medium" and "off." This primitive beginning has been somewhat improved, though the first one worked satisfactorily. It is desirable to have above the heater and within the box a diaphragm of metal or asbestos to produce a circulation. The diaphragm should be complete from side to side, but not reach to either end of the box. It should be tilted up toward the foot-end, so that the heat may rise up along the under side of the inclined plane of diaphragm, around the end at the foot of the crib, slide down again along the upper side to the interval at the head-end of the crib, and so on around the circuit. Circulation is an advantage

to the distribution of heat and to the preservation of the electrical apparatus itself. Any engineer can copy this at pleasure; the cost of material is about fourteen dollars. A manufacturing firm has planned to put a heater on the market, but it has not, to my knowledge, appeared, and there is no patent.

After a whole winter's almost constant use of six electric crib-warmers of the type described, we may report results satisfactory. No accident of any kind has occurred. It is impossible to burn a baby. It is easy to regulate the heat to the desired degree, varying it from hour to hour, also turning it off at will. We have kept the six warmers going all day and all night in cold weather, varying the heat as needed. It is readily seen that it is very little trouble to manage; it costs less than water bags in money and trouble. The electricity sufficient for an ordinary 16 C. P. illuminating bulb is all that is required.

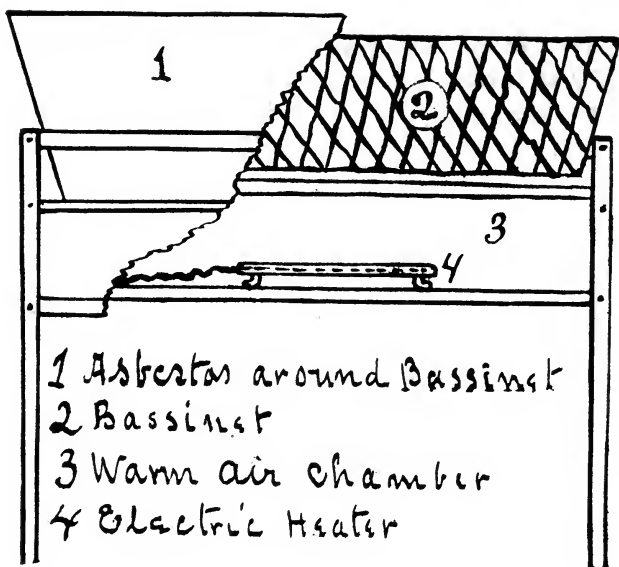


FIG. V.—Schematic drawing, showing construction of warmer.

As an incubator for premature babies it would seem to meet all indications. Heat comes up from below, the baby lies low in the bassinet, the sides of the asbestos trough come higher than the bassinet, so that the baby breathes warm air which circulates freely.



FIG. VI.—CRIB WARMER OR INCUBATOR.

A corner of the Children's Ward, showing (in the foreground) an especially devised crib. It is constructed of asbestos board and contains in a lower compartment an electric heater of the right heating capacity to keep the mattress warm for feeble and low-conditioned babies.

The electric crib warmer saves trouble, cost in water bags, danger from burning, and does keep the baby comfortable in cold weather.

VALUE OF THE VON PIRQUET REACTION IN CHILDREN.—Leo Cohn (*Berlin. klin. Woch.*, October 3, 1910) believes that the skin reaction is of most value in the tuberculosis of infants. A positive reaction in adults and older children has no practical value; a negative one is not against tuberculosis with any certainty in cachetic persons. Infection with tuberculosis is most frequent in the earliest months, especially in families that are tuberculous. A tuberculous infection in a nursing child has a bad prognosis. Of 18 cases infected in the first year, 16 died; only 2 failed to have a generalized tuberculosis within eighteen months.—*American Journal of Obstetrics.*

"WARD PROBLEMS."*

BY FRANCIS HUBER, M.D.,

Physician to Beth Israel Hospital (Children's Ward), New York.

The original ward for children at Beth Israel Hospital, located on the first floor, with a capacity of 17 beds two feet apart, and two feet from the wall, cut down to 13 beds to give the required air space, has been replaced by a new ward built on the roof. The number of beds has been increased so that at present we can accommodate about 25 medical cases in children up to the age of ten years.

To digress a moment. Personally, I consider the presence of older children, who are convalescent and able to be up and about, particularly girls from six to eight years of age, to have a most beneficial effect upon the younger patients. Not only do they hold the bottles, amuse and play with the little ones, when the condition of the latter permits, they at the same time act the part of volunteer "young mothers," for many of them are accustomed to mind their little brothers and sisters at home.

Our nurses are good and efficient, but their time is fully taken up with routine ward work. How much play means to the little ones in the absence of the mother, I need not dwell upon further or attempt to describe. To return to our subject.

Better provisions are also to be provided, thanks to the efforts of our efficient superintendent, Mr. L. J. Frank, and the broad views of our directors, for the surgical and otological cases.

Though the hospital is located in a thickly populated section of the "East Side," with unfavorable conditions around (a fish market to the northwest and a stable adjoining on the west) our results compare favorably with those of more pleasantly situated institutions.

In the new ward on the sixth floor, with a roof-garden above, we are singularly fortunate in the amount of sunlight, fresh air and freedom from street noise and dust. Situated about 55 feet above the street level, we have a clean sweep of fresh air circulating from the river, with extended and changing views, unobstructed by neighboring buildings. To the east of the ward there

* Read by title at the Annual Meeting of the American Pediatric Society, Lake Mohonk, June 1, 1911.

is an open space 12 by 26 feet not built up, affording a good view of the river, bridges, navy yard, etc., where the convalescing children may obtain the benefits of the open air. To the north there is quite a space, protected and shady, available for similar purposes. The spaces referred to are used only by the children, ample provisions having been made by the hospital authorities some time ago for adults.

It is further contemplated, a little later on, to cover over the space to the east with a structure of angle iron and glass, so arranged as to have the sides open in summer and closed in inclement weather and winter. Our facilities, it is true, have been greatly increased, but there is still room for further improvement, particularly in line with a view to prevent or minimize the dangers of the occurrence of infectious diseases in the ward.

The problems that confront the "attending" in the management of a children's service are manifold and varied. Ideal condition, demanding great outlay of money and space, possible in special hospitals, are almost impossible of realization in a general hospital with necessarily limited room and facilities. The exclusion of infectious diseases, as measles, scarlet fever and incipient whooping-cough, etc., with the longer or shorter period of incubation of the respective diseases, can only be accomplished by keeping new patients in a separate ward under observation for a period varying from one to two weeks or more.

This is not possible when a number of new cases present themselves in rapid succession. As long as we are not familiar with the specific organisms of a number of the infectious diseases there is danger of such cases being admitted in the very early stages before the characteristic symptoms develop. Recently an urgent case of empyema was sent in. Questioning elicited the fact that there was no scarlet fever in the patient's house. The child was operated. Four days later sudden vomiting occurred, temperature was noted, and the following morning a characteristic rash appeared.

As one or other of the contagious diseases is likely to crop out at almost any time in the thickly populated district, the house staff is always on the lookout. With the onset of any suspicious symptoms, the child is at once isolated and watched. We are particularly careful during the existence of an epidemic.

The early discovery and removal of suspected cases lessens

the danger of a general ward infection. On three different occasions during the past two months we have been able to check a further outbreak by removing isolated cases of scarlet fever as soon as the rash appeared, not admitting new cases for a few days.

Children who have had scarlet fever or diphtheria, etc., may still carry the infection through the nasal or aural discharges. Careful histories of possible recent exposures or the presence of infectious cases in the family or neighbors should be elicited. It has occurred to us more than once that the family, aware of the fact that positive statements as to the presence of such diseases would exclude the patient, suppress such information. Sometimes the family physician is at fault, the family having been posted by him.

Before admission to the children's ward a careful examination is made of the nose, throat and skin. If nothing suspicious is detected, the patient is kept under observation for several days in a special room, until smears of the nose and throat and, in case of girls, vaginal smears, have been made and the cultures reported negative. Routine examinations of patients in the ward are subsequently made at intervals, to discover possible bacilli carriers.

Diphtheria.—The type of the disease has changed materially. We do not, at the present time, encounter the severe cases so commonly met with twenty or twenty-five years ago. The improved hygienic and sanitary conditions and the methods adopted by the authorities have robbed it of much of its danger. With the precautions taken nowadays, earlier and more exact diagnosis and the advanced methods of treatment, the disease is more readily controlled and the mortality is less.

Visitors.—Visits to the ward by the family or friends ought to be interdicted. Aside from the danger of carrying in infectious diseases, there is the excitement, smuggling in of improper food or so-called dainties and interference with other patients, or the work of the ward. The effect of the visitors on the seriously ill patient is frequently detrimental. We are all familiar with the rise of temperature, restlessness, etc., following visiting hours. When the children's ward was located on the first floor, though the rule to exclude visitors was adopted, we soon discovered that it could not be enforced. The humor of the situation was evident when it was discovered that the fire-escapes were utilized by playmates and a bandage unrolled served as a string

to smuggle in various articles, while the nurses were engaged in their regular work. Since the service has been transferred to the roof, the rule has been more strictly adhered to. In exceptional cases of nursing infants, if the condition of the little one permits, the child is taken by one of the nurses to another room to be nursed, the mother wearing a clean gown provided by the hospital. If the child be too ill to be moved, the mother, in a clean hospital gown, is permitted to nurse the baby in the ward. It is understood, of course, that proper supplementary feeding is carried on at regular intervals in these cases. The plan is on trial at present; perhaps it may work out favorably in practice.

Similar precautions are taken when patients are on the danger list. As the parents and friends are informed beforehand of these restrictions and the reasons therefor explained to them, but little trouble or serious objections have been raised. "Individual precautions" are strictly observed. The various articles are kept in white enameled tables with two drawers—one for each adjoining bed. Thanks to the liberality of Dr. A. Hymanson, "associate visiting" to the children's service, our facilities for this purpose have been greatly improved. Our obligations do not terminate with the discharge of the patient. Through the efficient coöperation of the social worker, convalescing patients, as soon as their condition permits, are sent to the country or seashore to recuperate.

Through the same source, we have in some cases, been enabled to obtain the services of nursing women, to supply a limited supply of mother's milk to some of our sick infants.

The social problem of dealing with marasmic or ill-nourished children and infants cannot be solved in institutions. The children can only be kept in the hospital during an acute exacerbation or because of some complication.

Better results are obtained by adopting Dr. H. D. Chapin's plan along the lines of family life practiced in the Speedwell Country Home Society.

To group pneumonia, diarrheal conditions, typhoids, etc., in individual wards, possible in an up-to-date children's ward hospital, is not feasible in a general hospital with a children's service. A proportionate number only should be admitted. There should be no overcrowding.

"Individual precautions," conscientiously carried out, lessen the dangers of ward infection. Again, I would say, chronic dis-

turbances of nutrition in infants and young children, particularly during the summer, ought not to be treated in the institution, except to tide over an emergency.

The great increase in artificial feeding, the congestion of the population and the general conditions of existence have or exert a most depressing influence, in spite of better means of infant feeding. The stagnant air in the dwellings, the high temperature in rooms in summer with hot nights are factors of great moment in the causation of diarrheal affections.

Bacterial contamination of the milk, bacterial infection of the gastrointestinal tract may be contributing causes, but they do not explain in themselves the high mortality during the hot months. Under the broad popular terms "summer complaint" and "summer diarrhea" are included the symptom-complex—diarrhea, vomiting, fever, loss of appetite with more or less evident disturbance of nutrition. We have long recognized that the largest mortality occurs during the heated spell among children who have previously suffered from conditions of lowered vitality with digestive disturbances or whose digestion is below par. In private practice the removal of such children from the city to the country is advised as a therapeutic and prophylactic measure. We do not wait for the summer, but send them away late in the spring. Such too should be the rule in social work in the congested districts and in hospitals. Send such patients to the country, where the days and nights are comparatively comfortable and they will thrive, even if the milk supply is not quite up to the standard.

Poliomyelitis and cerebrospinal meningitis have, during former epidemics, been allowed in the same ward with other children, without subsequent infection of other patients, many of them seriously ill and in lowered condition with such diseases as pneumonia, empyema, etc. Though the diseases referred to are undoubtedly contagious, the danger apparently is not great, for in our hospital experience no new cases have developed in the children's ward.

In spite of the differences as to the degree of contagiousness, general preventive measures are imperative and should not be neglected. The experiments of Osgood and Lewis strengthen the suspicion of human carriers and raise still further doubts as to the efficiency of prophylactic measures directed only to the persons in the acute stages.

The virus of poliomyelitis is destroyed by comparatively weak

disinfectants, such as 1 to 500 potassium permanganate, 1 per cent. menthol in oil, a powder of menthol 0.5, salol 5, and boric acid 20. Frost (Public Health Bulletin, No. 44, February 19, 1911) claims that a 1 per cent. solution of hydrogen peroxide destroys the virus and recommends the use of an antiseptic gargle of this remedy. It is important to remember that insects may be passive carriers of the infectious agent of this disease. Flexner and Clark have but recently demonstrated this danger in respect to contaminated flies. The American Orthopedic Association and the American Pediatric Society have issued a circular, which states that poliomyelitis may be communicated from one person to another and by a third party. The cases should be strictly quarantined, the sputum, urine and feces disinfected and the same rigid precautions adopted as in scarlet fever. It is further advised that public health authorities make a careful study of epidemics.

Bacilli Carriers. The problem discussed under this caption is one of the utmost importance, presenting many difficult and obscure phases. As is well known, children ill with other diseases may reveal the presence of Klebs-Loeffler bacilli in the nose or throat, when the results of the usual routine cultures are obtained, without manifest clinical signs.

The danger to others and our therapeutic helplessness in getting rid of the bacilli, in these cases, is evident to all. Local treatment appears to have little or no influence in causing a disappearance of the organisms. Sprays of various antiseptics have been tried. Irrigations with different solutions give negative results. Ointments appear to offer a certain degree of protection by coating the nasal mucous membrane. I have been particularly pleased with a weak calomel ointment.

Prevention from contact is most important. Experience has taught us further that the infections may be transmitted from one bed to another by "the spray of the open cough and the open sneeze."

Northrup advises a "grille" or bed screen, consisting of a three-leaf wire screen with two way hinges.

Holt, with increased facilities and room space, adopts a better plan in resorting to the alcove arrangement, marble or heavy plate-glass slabs serving as partitions between the beds.

Antitoxin is of no avail in "carriers," even in large doses. Perhaps local treatment along the following lines may solve the difficulty.

An editorial (*Medical Record*, May 6, 1911) refers briefly to experiments made by several Russian physicians.

Dershovsky produced an active immunity by introducing subcutaneously rising doses of diphtheria toxin. He also demonstrated on himself that the toxin may be introduced in the simplest way, by passing into the nostrils for several days in succession pledgets of cotton soaked in the toxin. The degree of active immunity by this method is greater, though it takes a longer time to develop.

Notwithstanding the preliminary routine examination and the negative bacterial findings in the vaginal smears, a more or less abundant discharge is occasionally discovered some time after admission.

Though the characteristic organisms are now discovered for the first time, the case is not necessarily a new infection—it may be merely a recrudescence of a latent infection, to be isolated without delay. In hospital practice the slightest discharge should be investigated. It is an excellent plan to place a small piece of sterile gauze against the labia in order that any excess of secretion may be detected early. In our children's service, when a case is detected, the little patient is isolated at once or transferred to the female medical ward where the danger of spreading the infection appears to be *nil*.

No matter what measures are taken, though the nurses may be under special instructions and specific precautions observed, specific vulvovaginal catarrh is ever a source of danger in a ward. There is the danger of a weak link in the chain; the only way to prevent a ward infection is to remove and quarantine the affected patient. The cases are highly contagious and the epidemics difficult to control.

An exhaustive study of the subject, extending over a number of years, was instituted by Holt. I cannot express too highly my appreciation of the work done by him. I indorse most fully his conclusions, having had ample opportunities to study the subject in hospital, dispensary and private practice. I shall take the liberty to quote the following from his article, "Gonococcus Infections," in the *New York Medical Journal*, March 18 and 25, 1905.

"In a disease so difficult to cure and so highly contagious, the utmost importance must be attached to measures of prevention. In the light of our experience two things are essential in insti-

tution practice: first, cases of gonococcus vaginitis must so far as possible be excluded. In the second place, if admitted by accident or otherwise they must be quarantined. In excluding cases only one thing can be depended upon, viz., microscopic examinations of a smear from the vaginal secretion before the child is received."

In the paper on vulvovaginal catarrh (ARCHIVES OF PEDIATRICS, page 480, Vol. VIII., December 1, 1899) the writer asserts: In institutions it may spread rapidly and appear epidemic in character. It is a good plan under such circumstances to isolate the cases. Additional nurses should be assigned and their entire attention devoted to the little patients. During the existence of the trouble strict isolation should be insisted upon, the patients quarantined until the microscope fails to reveal the infectious organisms.

On page 482, under Treatment, the statement is made that "the patients should be isolated and quarantined to prevent the spread of the infection. The necessity of a strict adherence to this rule is evident to anyone who has had experience in this line."

The relatively frequent occurrence of colon bacillus infection of the urinary tract, at least 90 per cent. of the cases occurring in female infants, requires careful study with a view to prevention. In a large proportion of the cases, the process is supposed to be due to the ascending infection from without—contamination from the rectum.

The close proximity of the urethra to the anus, the short urethra of the female, and the frequent contact with the discharges, together with the habit of working with the diaper from behind forward, lends a very plausible explanation to this view.

The treatment of chorea, excluding the rheumatic type, presents some interesting features, in view of the neuropathic condition of many of our patients. There is the possible danger of the development of new cases in neurotic children through mimicry or mental impressions upon an unstable nervous system. The severe cases are kept in cribs, the sides being high, well padded and covered, thus forming an efficient screen. Kept under the influence of codeia, warm baths being given daily, the patients do far better in the ward than if isolated. Thoughtless and mischievous as children are, I have frequently been surprised by the consideration shown the afflicted patients by their companions in the ward.

The not infrequent occurrence of a number of cases of otitis in the ward in patients suffering from various affections deserves further study with a view to prevent such outbreaks. Now and then, particularly when a number of typhoids, pneumonias or empyemas have been in the ward for a time, the patients develop an acute nasal catarrh, with negative bacteriologic findings, yielding readily to normal saline douching. A little extra attention to the toilet of the nasopharynx may abort such mild epidemics in children predisposed to catarrhal conditions in consequence of the presence of lymphoid hypertrophies.

The dangers of "hospitalisms" are greater in the infant and young child. Patients under two years ought not to be allowed to remain any longer than absolutely necessary after convalescence has been established. The older the child, the less the danger.

The reprehensible practice of cleansing the mouth of little patients with gauze or absorbent cotton wrapped about the little finger should be abolished. Bednar's aphthæ in the infant and a possible infection or spreading of disease through bacilli carriers are a few of the dangers. Small swabs, made with wooden tooth-picks and absorbent cotton, are preferable.

The frequent administration of a weak acidulated drink or frequently moistening the lips with a solution of borax Si , glycerin $\text{Si}\frac{1}{2}$ and rose water to Siiv , serves the purpose of keeping the lips, gums and mouth in a fair condition.

The above is not an exhaustive exposition of the subject; it is merely suggestive and written in the hope that it may bring out the views of our members and the precautions taken by them in their hospital practice.

SCARLATINA AND VON PIRQUET'S REACTION.—F. Brandenburg (*Deutsch. med. Woch.*, 1910, p. 561). A child, aged two years, with signs and symptoms of pulmonary tuberculosis, developed scarlet fever in March. Von Pirquet's reaction was negative then, but was definitely positive two months later. Death from generalized miliary tuberculosis took place in the following September. This case shows that the cuti-reaction may be negative in scarlet fever as well as in measles, in spite of the presence of tuberculosis.—J. D. ROLLESTON.—*British Journal of Children's Diseases*.

MANAGEMENT OF THE PEDIATRIC SERVICE IN GENERAL HOSPITALS.*

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The inadequacy of pediatric service in general hospitals was observed by the writer some years ago while engaged with a committee investigating methods of case recording.

A number of small hospitals in suburban New York were visited or consulted, with the result that a very limited number were found to have systems available for reference. This was notably true of the pediatric departments, which, upon deeper investigation, were found to be but one of the factors open to criticism. Lack of interest, inadequate equipment, faulty hygiene, deficient nursing service and unskilled feeding were frequently observed. In many instances proprietary foods were largely employed and the formulæ provided by the manufacturers of Mellin's and Eskay's Foods were used by some. Diaper rashes were prevalent in several of the wards, and in one vulvovaginitis was acknowledged with seeming indifference. Individual thermometers were not always provided. There was found a general lack of clinical laboratory equipment. In one instance the nursing bottles and nipples were washed in the sink where the towels from the operating room were washed. The superintendent of this hospital was obliged to resort to extreme measures to prevent the washing of the towels in this sink that had been used in an operation where a liter of tuberculous pus had been drained from a man's thigh. Evidence of research work was almost entirely wanting. Reference to pediatric literature confirmed this lack of interest, for, notwithstanding the large number of infants and children in the aggregate under observation and treatment, relatively few reports, and still fewer deductions, were on record from these sources. In searching for the causes responsible for these deplorable conditions one could not escape the conviction that the basic cause was in the personal management of the children's wards due to the rotation plan of medical service generally employed. Pediatric service as observed in general hospitals may be divided roughly into two classes:—

First, those having a separate pediatric service under the control of a medical head on continuous service.

* Read at the Second Annual Meeting of the New Jersey State Pediatric Society, Hotel New Monmouth, Spring Lake, N. J.

Second, those having a separate children's ward, but the service in the hands of the department of general medicine. A large majority of these institutions still maintain the rotation service under which pediatrics becomes a side issue to the department of general medicine. The two exceptions in this state being, as far as I can learn, the children's wards in the Paterson General and Christ Hospital in Jersey City. In both of these hospitals the pediatric service, under the guidance of competent medical heads on continuous service, is rapidly developing into important departments with prominent and extensive references in the annual reports. I am informed that Dr. Stern, of Elizabeth, has been recently favored in this direction.

Pediatric service differs from any other in the hospital. The service in the general medical division concerns people who, for the most part, are acutely sick and when recovery takes place and they are discharged independent and able to care for themselves. Not so with infants, a large majority of whom are artificially fed. They are brought to the hospitals largely for diseases dependent upon malnutrition, carelessness, or ignorance in feeding. When relieved of this acute condition they are discharged and returned to their former surroundings, where recurrences are frequent. In the records of the hospital, if any are made, such a baby is reported as cured when perhaps long before the annual report finds its way to the public many of these cases perish from a recurrence of the conditions, or similar condition, for which the child was originally brought to the hospital. The baby's acute illness was cured, but the baby was not.

The attending staff of these hospitals usually comprise all the physicians in the immediate locality, selected without due regard for general or special qualifications. Men socially or politically popular, without regard to professional or scientific attainment, frequently receive the appointments. In order that these may be favored with service of equal rank, they are all made attendings on the rotation plan. In the surgical and general medical service this plan can be followed with less disadvantage than in the pediatric service for the reason that the sociologic, hygienic and dietetic problems connected with the successful treatment of infants and children requires more careful and prolonged observation than is possible with the rotation plan. While the conditions as detailed may not be generally apparent it must be obvious to all interested that the hygienic, prophylactic and cura-

tive results are exceedingly limited when compared with the opportunities which a liberal though credulous public are providing. With infant mortality and morbidity statistics showing slight, if any, improvement during a period rich in discovery of factors, which, if properly applied, would diminish both morbidity and mortality; there should be loud and persistent call for administrative changes in pediatric hospital service. One notably prominent obstacle which befalls the lay mind and confronts efforts looking to a change or realignment of the management of pediatric service in the general hospitals is fostered within our own ranks regarding its position as a specialty in medicine. Most practitioners claim, and some pediatricians admit, that it is not a specialty, but a department of general medicine. The writer supports the contention that in the highest sense pediatrics is a specialty. True, not in the sense that ophthalmology and otology are regarded as specialties, because they have reference to special organs of the body, but in the broader sense that pediatrics deals with all the organs of the human body, but limited to the period of infancy and childhood.

For the most part these diseases occur in all periods of life, but with manifestations vastly different in the child. It must be conceded that dietetics and nutrition in infancy and children is peculiarly a special study and inseparably united with the broad subjects comprised under the heads of hygiene, sanitation, ignorance and poverty. The physician who would effectively and honestly practice in this field must, therefore, become a medical sociologist. Of what value are statistics of factors or combinations of factors regarding pediatrics when compiled by those whose observation has been limited to the sick children, while investigations of environment have been wholly neglected or superficial in scope? Of what value are deductions from such statistics in the uplift of humanity, which should be the guiding star of all medical investigation? In addition the successful practitioner of pediatric medicine should acquire a thorough knowledge of animal and dairy hygiene and dairy chemistry; because from this source is derived the sole food supply for a large percentage of those under his care. A technical knowledge of these subjects is fundamentally necessary for the intelligent modification of milk. Another important factor regarding pediatric practice is the personal equation. That many successful practitioners of general medicine fail in pediatric service is so frequently

obvious as to require no apology for the statement. Diagnostics applied to infancy and childhood differ materially from that in adults. In infants and young children symptomology is largely objective and physical signs must be interpreted in accordance with the anatomic and physiologic conditions peculiar to age and development.

A careful study of the conditions above has convinced the writer of the futility of improving conditions or results under the rotation plan of hospital service, notably so if maintained under the direction of the general medical service. A comprehensive consideration of the whole field of pediatrics easily establishes it as the most important of all the departments in the hospital, and it deserves to be placed on a special basis under the guidance of a single head on continuous service, who has demonstrated by work previously done his or her fitness for the position. There should be maintained in close association, or under management of the department, an efficient out-patient department, with visiting nurses and a follow-up system of individual records, a research laboratory, a diet kitchen and isolation ward. Babies acutely sick, where the home conditions are unfavorable, if artificially fed, should be removed to the hospital. If breast-fed the mother should accompany the baby or appear at stated intervals for the purpose of nursing her baby. Mothers with an abundant milk supply and a well-nourished child, who would be required to wean her baby in order that she might earn a daily wage, should be induced to sell a part of this supply for the rescue of a less fortunate infant while she partially nurses her own baby. The beneficent results of such a scheme are sufficiently evident from an economic consideration of the foster mother and the saving of an otherwise fatally sick baby, and makes such a material outlay to the hospital justified and desirable. [That such a scheme is practicable in a service as outlined has been demonstrated repeatedly in the Babies' Dispensary, Englewood, N. J., during the past three seasons. In 1909, a few months after the organization of the dispensary, it was difficult to interest nursing women to the extent of a willingness to sell from their supply for very sick babies. Next season by constant education in this direction we did very much better. The educational propaganda was continued during the past winter, and this year when the occasion arose the mothers volunteered or immediately responded, with the result that an eight-week-old baby that would certainly

have died from inanition, vomiting and diarrhea, was saved. Rice and barley water, whey, etc., was rejected. The baby was unable to suck and was fed by dropper. Hypodermoclysis became necessary. A colored woman supplied by breast pump 60 c.c. per day for two weeks; during part of this time she was obliged to mix feed her own baby. A Swedish woman supplied for one week 180 c.c. per day in two pumpings, and for three subsequent weeks 120 c.c. per day in one pumping. An Italian woman supplied for two weeks 120 c.c. per day. Another Italian woman supplied for one week 90 c.c. daily. A Scotch woman has supplied 90 c.c. per day and still continues. Total supply to September 2, 1911, 12,330 c.c. (12.33 quarts). The baby in question weighed at birth 3,600 grams (8 pounds). It was brought to the dispensary when seven weeks old weighing 2,869 grams (5 pounds, 4 ounces). Three days later it weighed 2,580 grams, when mother's milk was substituted and fed by dropper. Weight September 2d 3,612 grams (8 pounds). Sufficient mother's milk was available for its entire nutritional requirements for ten days, after which goat's milk was gradually substituted, until now the baby has seven feedings of goat's milk and one of mother's milk in twenty-four hours.]

To assist the chief of such a department there should be medical attendings and a supervising nurse who should give all her time to this department. She should select from the corps of pupil nurses in the hospital those who develop special aptitude and interest in the care and handling of children. They should receive instruction in the wards and at the bedside in the homes of the little patients, they in turn instructing the mothers and older sisters in the care of sick babies. The service should include direction of the care of the well babies and accurate record of the environment between illnesses in order to establish intelligent etiology. If the hospital has an obstetrical department cordial relations should be established between it and the pediatric department. The babies born in the obstetrical ward should at once come under the influence of the pediatric department and a record begun of the baby which should be followed up when it goes home, visited at stated intervals and the record continued. In connection with the out-patient department there should be maintained a milk dispensary, where, for a nominal price, or free under exceptional circumstances, properly modified milk could be dispensed. Fixed formulæ should not be employed, but each child examined and

weighed, and the modifications made in accordance with individual findings. The nurses in making their rounds in the homes, should note the occurrence of illness and report to the medical service of the department, when, if necessary, the child would be visited by one of the staff if too ill to be brought to the dispensary. There has been much criticism of statistics emanating from children's dispensaries; on the other hand, and for obvious reasons, the statistics from pediatric wards are not at all times regarded as reliable. An amalgamation of the hospital wards and dispensaries under competent management, together with an accurate follow-up system of record keeping, would add much to the value of pediatric statistics. Under this form of management there would be required more workers, hence local professional jealousy would be less evident. There would be correlation of the forces—hence no confusion—and from the ranks of attendings the hospital could with obvious advantage replace its chief when removed by disability or death.

The primary establishment of such service in a hospital must necessarily cause some bickerings, disappointments and heart-aches, but a hospital association that has not the courage to cast these matters aside, and to be absolutely impersonal for the sake of the serious obligations which the hospital necessarily imposes, should resign and give place to such citizens who possess that courage.

The writer realizes the difficulties involved in the selection of those professionally competent by a lay board, and that the inauguration of such a régime would probably entail some over and under estimates, but in the course of such service, after two or three resignations or retirements, mistakes in this direction would be less and less evident.

CONCLUSIONS.

(1) True pediatrics involves constant oversight of the child, while hospital ward service is incidental.

(2) This oversight is attainable with a well-organized department under competent and constant medical direction, and in no other way.

(3) Visiting nurses' service, Welfare Associations and Dispensaries should be, as far as possible, correlated or amalgamated with the pediatric service of hospitals which should have charge of the records and classify them for reference.

THE SURGICAL MANAGEMENT OF ACUTE ABSCESSSES OF LYMPHATIC GLANDS IN INFANCY.*

BY THOMAS S. SOUTHWORTH, M.D.,

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No surgical dictum has a broader application or more universal following than that which predicates that where pus exists it must be evacuated. That modern advances in the treatment of tuberculous or cold abscesses have led to some modification of its applicability in a limited field is but the exception which proves the rule. Almost as a corollary of the proposition that pus collections should be relieved by incision, there has grown up also a universal teaching that they should be laid open freely with a liberal incision.

Of course, if we assume that but one rule is to be applied to all purulent collections, no one will deny that the free incision insures the greatest safety in the largest number of cases. The futility of small incisions in cellulitis where the infection is diffuse and the process advancing, or in a deep-seated felon where necrosis of tissue threatens or has already taken place, has long been recognized. It is, however, worth considering whether this surgical canon has not been interpreted too broadly in extending its application to localized collections of pus, such as involve little of the danger associated with the rapidly spreading or necrotic types.

I have no desire or intention of trenching upon the field of the general surgeon, nor of entering upon any further discussion of adult surgery, wherein my qualifications to advance an opinion might be questioned, but propose to confine myself to a group of cases belonging to the minor surgical affections of infancy, whose management falls naturally in the domain of the pediatrician, and where, in consequence, his experience over a period of years exceeds, as a rule, that of the general surgeon.

I refer to acute suppurative processes in the lymphatic glands

* Read at the Twenty-third Annual Meeting of the American Pediatric Society, Lake Mohonk, June 1, 1911.

in infancy. Here we are dealing with a suppuration beginning within the capsule of the gland, and rarely extending outside it, except in search of an exit to force its way to the surface or along some other line of least resistance. This latter tendency does not ordinarily produce a diffuse suppuration, but is a conservative process, planned by nature solely to accomplish the spontaneous evacuation of the purulent collection. As soon as such relief has been attained, the reparative forces of the body direct their energies to the task of restoring the tissues as nearly as possible to normal conditions.

When a lymphatic gland, one of whose important functions it is to arrest noxious bacteria brought to it by the afferent lymph vessels, finds the task too great, suppuration ensues within the gland. Up to this point, although there is inflammatory enlargement of the gland, the gland remains distinct and movable, with no noticeable periadenitis. Upon the extension of the suppuration toward the periphery of the gland and progressive destruction of its parenchyma, a second line of defensive inflammation is established about the capsule, which limits the destructive process, except at the point which may be chosen as most suitable for spontaneous evacuation of the pus. At this stage, then, we have a periadenitis, the gland is less movable, and the presence of pus is practically certain.

From the foregoing it would seem possible to draw several lessons.

(1) That in the common acute type of glandular suppuration in infancy and early childhood suppuration is not diffuse, but more or less limited by the line of the distended capsule of the gland.

(2) That the infection having been rounded up and brought under control by the sacrifice of the parenchyma of the gland, nature seeks as speedily as possible to evacuate the pus and detritus.

(3) That our purpose, therefore, in incising such abscesses is not to check a destructive process by heroic measures, but to give just the requisite amount of aid to complete a conservative process.

(4) That when this is accomplished, restitution of the surrounding tissues proceeds with the greatest rapidity.

It is probably the experience of others, as well as of myself,

that incision of a gland which is only partially broken down into pus delays rather than hastens the period of healing. Once supuration has begun in a lymph gland its structure is apparently such that its destruction cannot be limited, but the entire gland must be broken down and thrown off. This process appears to proceed more rapidly before than after incision. Moreover, since complete breaking down of the gland is usually also accompanied by evidences of pointing, which indicates to us the most suitable point for incision, it is advisable, unless there are definite contraindications, to await distinct fluctuation before undertaking surgical relief.

In supuration of the deeper lying cervical glands, however, especially those lying beneath fascia, which reach the surface with difficulty, pointing, in the sense of increased redness, need not be awaited, but the site for incision chosen where distinct fluctuation is most superficial. If we follow nature's wise lead in this particular, the required incision will be of less depth and will, as a rule, be more likely to avoid important structures.

It is, however, upon the size of the necessary incision, and the nature of the drainage employed, that I wish to speak with particular emphasis. We have already seen that nature only seeks an exit for the pus, and when this is suitably accomplished is ready to begin immediately the work of repair. It is understood, of course, that I am speaking only of acute processes, and not of tuberculous processes, which are subacute or chronic. The only justification for a large free incision is to secure drainage. Such free incisions in these acute abscesses of infancy, especially when made upon an exposed region, such as the neck, are not only unnecessary from a surgical standpoint, but unnecessarily mutilating from a cosmetic standpoint.

As a rule, free incision and gauze packing go hand in hand. Necessary as they may be in diffuse suppurations, or where it is advisable both to prevent the reaccumulation of pus and to stimulate the tissues to throw off necrotic shreds and form healthy granulations, they are out of place in the glandular abscesses of infancy. The smallest incision which will allow of gentle expression of the pus, and the smallest tube drainage which will permit the continuous escape of the subsequent sero-purulent discharge from the cavity, are all that is ever required.

Gauze packing, except in large wounds, dries in a few hours

at the exit from the wound, and seals the exit. It then acts as a dam rather than a drain. Packing of the glandular abscess in infancy also prevents, rather than aids, the rapid contraction of the cavity, which is nature's first step toward its obliteration. Free incision and attempted drainage by gauze are here illogical, the misapplication of a valuable principle where the indications for its use are not present. Cure, of course, follows free incision and gauze packing, but at the expense of more discomfort, slower healing, and a more disfiguring scar.

A long and not inconsiderable experience with all the usual ways of dealing with these rather common abscesses of infancy has led me to adopt the following plan:—

As soon as the gland has softened so as to give distinct fluctuation, a site for the incision is sought, where the overlying tissues are thinnest, preferably near the lower border of the mass, and, if possible, in one of the natural folds of the skin, which may show as fine lines upon the surface. An incision not exceeding five-sixteenths of an inch, and often shorter, is then made with a narrow, straight bistoury, through the skin and subcutaneous tissue, and, if pus is not immediately reached, further dissection and penetration is accomplished with a grooved director, until pus flows. Gentle pressure with occasional introduction of the director to dislodge flocculi is continued until the evacuation is complete.

The smallest drainage tube obtainable, not exceeding three-sixteenths of an inch in diameter, is fenestrated, slipped over a probe, and introduced to the bottom of the cavity. A bit of small catheter, from which a small segment has been cut longitudinally, in lieu of fenestration, serves well. A corkscrew motion often facilitates the introduction of either form of drain. If the incision proves rather small it may be stretched with dressing forceps or artery clamp, but not enlarged by cutting. The usual safety-pin of small size guards the drain, and a dry or moist dressing is applied.

This dressing is changed on the second day thereafter (forty-eight hours). Already the walls of the abscess cavity have contracted, and there are evidences that granulations have grown into the fenestræ of the tube. As a rule, only a little milky pus from the granulations can be expressed from the tract. In abscesses lying near the surface, the tube may often be removed

entirely at this dressing, sufficient drainage being provided for by the temporary fistulous tract formed by the tube. In instances where the tube is found displaced by movement of the dressing, it is not necessary to replace it if the introduction of a sterile probe or director does not reveal retained pus. If, however, the abscess is one of a deep gland, and fascia has been penetrated to reach it, it is wiser to reintroduce the cleansed and shortened tube, to prevent retention by the narrow opening in the fascia.

At the second dressing on the fourth day, the tube may usually be dispensed with, and a dressing of ichthyol ointment—10 to 20 per cent.—applied and employed for subsequent dressings until cicatrization is completed. This is not only more comfortable for the infant than the usual dry or moist dressing, which soon adheres to the wound, but, while favoring drainage, also exerts its characteristic influence upon surrounding induration of tissues or neighboring glands. Complete closure with a minimal scar is found by the seventh day. I have but rarely been obliged to reopen the wound with a director after it has closed, and in these cases the character of the pus has indicated the breaking down of another gland and the escape of pus along the track of the first operation.

Under this simple but rational handling the rapid contraction of the abscess cavity and the restitution to normal has been surprising. The early removal of the tube I arrived at gradually, as the result of the successful outcome of cases where the tube was displaced accidentally by shifting of the dressings. The results of gauze drainage in my earlier cases, and in many others where I have made subsequent dressings upon cases operated upon by colleagues, do not compare with those from the use of the tube. There is almost invariably retention of discharges from sealing of the orifice by gauze. Packing not only prevents the rapid collapse and contraction of the cavity, but its use does not permit of so small an incision.

The lessened discomfort to the patient during the secondary dressings, while not a determining argument in favor of the procedure, is not without its appeal to the surgeon, and doubtless also to patient and friends. The minimal cicatrix is perhaps its strongest recommendation.

THE TREATMENT OF FURUNCULOSIS IN CHILDREN BY BACTERIAL VACCINES.

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The brilliant results in the treatment of furunculosis by bacterial vaccines more than anything else is responsible for the widespread interest this form of therapy has commanded in the past three or four years. The results from its use in this infection in the thousands of cases treated by various men throughout the world have been so uniformly good that it now stands at the head of the list in the therapeutics of this painful, stubborn infection.

While its value has been so definitely established in the treatment of adults suffering with furunculosis, I have seen little in the literature as to its use in infants suffering with the same infection. In the past three years I have had the opportunity of treating 28 cases in children varying in age from two months to three years, including those with a few scattered furuncles here and there to cases in which they were so large and numerous that it was difficult to find a spot not infected for the passage of the hypodermic needle.

The staphylococcus aureus and albus were the causative organisms in all cases. The average initial dose was 25,000,000 staphylococci. Some cases received as high as 150,000,000 without untoward results. The average number of inoculations per patient were three, spaced seven days apart. In 3 cases there was slight redness and swelling at the point of inoculation, which subsided in two or three days. It was not an uncommon occurrence for a fresh crop of furuncles, usually small in size, to appear two or three days after the first inoculation. This, however, did not follow subsequent inoculations.

The most interesting case among my service was a girl one year old, who after a rather protracted attack of enteritis became covered with small pustules, probably the size of a pea, and apparently harmless. The physician in charge, after correcting the feeding, treated the local infection by the usual means of evacuating the pus, and the internal administration of calcium sulphide. Despite his persistent efforts, the number of pustules increased both in size and number. At the time I saw the child,

one month after the beginning of the infection, the entire body was covered with furuncles about the size of a small hickory nut, many of which had been opened and were discharging freely. Its respirations were shallow and rapid, probably due to a septic pneumonia. Its temperature was 102. A culture was taken from one of the furuncles, and the infecting organism found to be a staphylococcus aureus. A vaccine was prepared and on the following day the patient was inoculated with 25,000,000 of the dead organisms. I might add that, owing to the number of furuncles, it was difficult to find a spot not infected for the introduction of the hypodermic needle. Seven days later the furuncles that had been opened had stopped discharging and were beginning to heal. The breathing had become better and the child's temperature was normal. After four subsequent inoculations, spaced seven days apart, the last of which was 100,000,000 dead staphylococci, the furuncles had all disappeared, the respirations were normal, and the child made an uneventful recovery.

These extreme cases I know are not common, but the results produced by only four inoculations serve well to illustrate what could be accomplished in similar infections of a lesser degree by bacterial therapy.

Two years ago I had occasion to treat another interesting case in a young boy three years old, who had suffered with crops of furuncles on the neck, appearing about every two months since his second year. A vaccine of the causative organism, a staphylococcus aureus, was prepared and the child inoculated with 25,000,000. The existing crop of boils disappeared very promptly. The mother was then instructed to bring the child back once a month for an inoculation with the hope of preventing a recurrence. This plan was followed out for eight months and the child inoculated with 50,000,000 of the dead organism each time. During this period and since the child has had no furuncles. A similar experience with an adult prompted me to suggest this plan.

It is, of course, advisable to open all existing furuncles at the time therapeutic inoculations are begun. The rapidity with which they subside after an inoculation is really striking. Most of my cases were treated by a stock vaccine, prepared from a similar infection, in my laboratory.

SOCIETY REPORTS.

THE PHILADELPHIA PEDIATRIC SOCIETY.

May 9, 1911.

J. TORRANCE RUGH, M.D., PRESIDENT.

A CONSIDERATION OF THE CAUSES OF THE HIGH INFANT MORTALITY DURING THE SUMMER MONTHS. TRANSMISSION OF INFECTIONS.

DR. ALLEN J. SMITH, by invitation, read this paper. After indicating that in any case the transmitting agency of an infection is to be referred to either a vital bearer or to some non-vital substance upon or in which the infection may happen to be present, and after stating that in a broad way the infant mainly owes its well-known relative freedom from infection in the first months of life to its isolation, Dr. Smith took up in turn a number of the more striking illustrations of living and non-vital bearers of infection and infestation. Of all animal conveyers man is himself the most common transmitter of infections to the infant. Therefore Dr. Smith urged the restriction, as far as possible, of indiscriminate fondling of infants by others than proper caretakers. Animal household pets, particularly cats and dogs, were held responsible not infrequently for the infection of children as well as adults, especially in connection with ringworm and analogous skin infections. Insect transmission of infections occurs in infancy and childhood precisely as in later life—the accounts of Koch, Wellman and others in reference to the prevalence of malaria in early life in Africa, and of Guitéras in reference to yellow fever among children, being illustrations to the point in case of mosquitoes. Flyborne ophthalmias, suppurations and diarrheal affections (with reflection on the probability of a higher rate of typhoid fever prevalence in the first few years of life than is generally believed and the likelihood of its transmission by house flies) were instanced as examples of convection by this class; and the same possibility of other arthropods transmitting disease to infants and children as to adults was insisted upon under appropriate conditions of access. Dr. Smith referred to Patton's

work upon bedbugs as intermediate hosts of Leishman-Donovan bodies and to personal communications from Campbell, of San Antonio, Tex., upon bedbugs as possible conveyors of small-pox. Leaving, of the inanimate conveyors, the general consideration of milk and other foods for the subsequent speakers of the evening, and indicating the unlimited possibilities of acquirement of various infections and parasitic infestments from all sorts of objects with which the child is constantly coming in contact, Dr. Smith laid especial emphasis upon the possibility of easy acquirement of infectious organisms and parasites or their ova from floor contact when the infant reaches the crawling stage of its life. A striking clinical illustration of contact infection was mentioned in the case of a child about one year of age, observed by Professor M. B. Hartzell in the Dermatological Dispensary of the University Hospital, and by him mentioned to Dr. Smith. The child had well-developed lupus lesions on the hypothenar eminence of one hand and on one knee. Suspecting from the location of the lesions that it had been acquired from tubercle bacilli rubbed into the parts from the floor on which the child crawled, Dr. Hartzell readily elicited the fact that the child usually spent a large part of its waking hours on the floor of the room in which its father was confined to bed with advanced pulmonary tuberculosis, and that the child's mode of crawling was definitely on hands and knees. The adherence of bacteria, encysted protozoa, ova of intestinal parasites, as of *hymenolopis nana* from mouse droppings, along with harmless dust particles, to the moist and sometimes sticky hands of the crawling infant from the dirty floor, their ready transmission to the alimentary canal when the hands go to the mouth, the convection to the skin of the face and scalp when the dirt is rubbed into these parts, were referred to; and brief reference to acquirement of disease from the ground outside of the house was made. Soiled and infected clothing, bedding and toys as articles liable to convey disease were considered. In closing, Dr. Smith, while acknowledging the possibility of carrying his argument to a ridiculous grade of impracticability, insisted that the keynote of avoidance of infectious and parasitic diseases rested in the grade of isolation of the infant and the cleanliness maintained in its surroundings.

DR. SAMUEL MCC. HAMILL read a paper on "How Physicians Can Aid in Establishing Conditions to Control the Milk Supply, as Recommended by the Mayor's Milk Commission."

THE RELATION OF MILK TO INFANT MORTALITY.

DR. H. W. CONN, of Wesleyan University, by invitation, read this paper. He said that all dangers in milk are connected with its bacterial content. Milk is not necessarily harmful because it contains very large numbers of bacteria; for buttermilk is known to be good and it has millions of germs in it. But the presence in milk of certain bacteria, those of tuberculosis, typhoid fever, diphtheria and scarlet fever, constitute a great danger. The occurrence of any of these infections in milk is always due to careless handling of the milk. Besides these indefinite intestinal troubles of infants in hot weather, characterized chiefly by diarrhea, are due to bacteria in the milk; for they are more common among children fed on cow's milk; they are controlled by sterilizing the milk; they are most common in hot weather, when bacteria in the milk are most numerous; and they may be greatly reduced by rigid milk inspection. Certified milk is beyond the means of the masses. Pasteurization, properly performed, comes nearest to the solution of the milk problem. This is to keep the milk at 140° F., not higher, for a half hour. This does not change the digestibility or the taste of the milk, yet it destroys all pathogenic bacteria.

In opening the discussion, Dr. C. J. Hatfield said that the paper by Dr. Conn had been to him a liberal education upon the milk question. He did not feel qualified to discuss it beyond expressing his interest in and admiration for the work which Dr. Conn had carried out. As to the coming Milk Show, which he had been requested to speak of, he believed that it was the direct result of the work done by the Milk Commission of the Philadelphia Pediatric Society. He traced the influence of this work to the appointment of the Mayor's Milk Commission, the report of which, made public in February, marks a great advance in the campaign for better milk for the city. The Milk Show is a direct result of this work. The plan was initiated by the Director of Public Health and Charities and the chairman of the Milk Commission of the Pediatric Society.

DR. A. C. ABBOTT said that he objected to depending upon bacterial counts as tests for milk, since results were obtained after the milk had been consumed. He prefers microscopic examination of the milks after centrifugating, so that fifty or more examinations may be made in a morning. By this means many in-

definite infections may be discovered. Dr. Abbott has opposed pasteurization, as he considers it an obstacle to obtaining clean milk from healthy cattle. Five years ago no pasteurizing plant in this city was turning out milk that was not reinfected after having been pasteurized; this is probably true still. The damage done to milk is always due to ignorance, both of the producer and of the consumer. Dr. Abbott thinks that Philadelphia has as good a milk supply as any of our large cities. It is only a question of time until the recommendations made by the Mayor's Milk Commission will be met.

In closing the discussion Dr. Conn stated that he did not believe that milk inspection would eliminate tuberculosis from milk until the time when all cattle can be tested for tuberculosis, and that is a long distance ahead. In the meantime we are facing the problem of what to do before that time comes. He does not believe, further, that milk inspection or dairy inspection will ever be able absolutely to eliminate the possibility of the distribution of typhoid fever or other contagious diseases that are distributed by milk. It was a consideration of these facts that led him to accept pasteurization.

THE PHILADELPHIA PEDIATRIC SOCIETY.

June 13, 1911.

J. TORRANCE RUGH, M.D., PRESIDENT.

EARLY OPERATION FOR PSOAS ABSCESS.

DR. JAMES K. YOUNG showed a boy of six years who developed tuberculosis of the spine with psoas abscess, which was recognized by flexion on the opposite side of the thigh, high temperature, leukocytosis and a tender point in the loin of the affected side. The condition was verified by the X-ray and tuberculin test. Dr. Young performed the Trevos operation, making a lumbar incision, with the center over the transverse process of the lumbar vertebræ, dissecting down to the psoas muscle and evacuating the abscess. Dr. Young used a blunt instrument to open the abscess, kept up drainage for a few days only and recovery rapidly followed. The patient then wears a splint brace for a year or so.

NEW SPLINT FOR HIP DISEASE.

DR. YOUNG also showed a boy of ten years who had marked symptoms of hip disease two years ago. Extension was applied for two weeks, while the special brace was being made. This was applied for one year and then a convalescent hip splint was used. He has now entirely recovered. The special splint consists of a body, thigh, leg and foot portion, all made of hard leather over a cast taken from the patient, standing with the limb slightly abducted. The cast extends from the axilla to the toes. The body portions made over the cast are connected by a bar of steel passing down the back of the body and limb. Opposite the calf the extension is provided and the leather portions are secured with lacings. Two perineal straps are used and the patient walks with a high shoe and crutches. The splint is applied in the recumbent position, the brace being one-half inch longer than the limb. The patient is laid into the brace, the body portion is laced, the perineal straps are applied, the foot is pulled down into the foot piece so as to make extension and is secured by lacing; later the thigh and cap portions are also laced. This splint combines traction and fixation, is very light and comfortable, and the patients make more rapid recovery with its use than by any other form of apparatus.

DR. RUGH said that recovery with function was the result desired in such cases. If they are seen early and the diagnosis is made early, good results are possible. But many cases advance without recognition by the attending physician, abscess occurs and recovery with function becomes impossible. Yet Dr. Rugh recalled a case of hip joint disease in which operation was done, curetment and removal of the head of the bone, yet three-quarters of normal range of motion resulted.

DR. YOUNG then demonstrated the splint on and off the patient.

MICROSOMIA.

DRS. CHARLES A. FIFE and BORDEN S. VEEDER showed a girl of six and a half years, who was normal at birth and grew until eighteen months old, but has not grown any since. Alcoholism in the mother; parents and other children are of normal size. Table food was begun at eighteen months of age. She had several attacks of diarrhea during her second summer, also per-

tussis and measles. Her total length is 80½ cm.; length from acromium to spine of ilium 22 cm.; from anterior superior spine to external condyle of femur 21½ cm.; from external condyle to external malleolus 14½ cm.; length of foot 11 cm.; length from acromium to head of radius 13 cm.; greatest circumference of head 44½ cm.; circumference of chest 45 cm.; circumference of abdomen at umbilicus 45 cm. There are no signs of cretinism, rachitis or tuberculosis present. Heart and lungs negative. Abdomen slightly distended, apparently from muscular weakness. Teeth are normal. X-ray shows retarded bony development, the wrists showing but four centers of ossification and the bony framework proportional to the rest of the body. Urine and blood examination negative. She walks, talks and is of good mentality. Was placed upon nitrogenous balance and the urine examined for a week. The nitrogen partition was about normal. Creatinin elimination was .0079 gram per kilo.

RACHITIS.

DRS. FIFE and VEEDER showed an Italian baby of eighteen months with marked epiphyseal enlargement. X-ray plates showed very little calcification at the ends of the bones and the shafts of the bones were less than a third of the thickness of the epiphyses. The musculature was exceedingly flabby and the child does not use feet or legs. The pelvic outlet is narrowed, which with some bowing and shortening of the femurs produces a condition simulating congenital dislocation of the hip.

CONGENITAL HEART DISEASE.

DRS. FIFE and VEEDER also showed a girl of two years, admitted to St. Christopher's Hospital for Children for dyspnea and lassitude, conditions which have not been present since admission. Mother had tuberculosis. Birth was normal and child was not a blue baby. Her only illness has been pertussis. She is well nourished; no cyanosis; fingers somewhat suggest clubbing. Heart enlarged to percussion, from second interspace to left nipple line, to 2 cm. to right of sternum. There is a faint thrill, rather diffuse over lower part of precordium, most marked in the fourth interspace at left border of sternum. A loud, rasping murmur, systolic in time, replaces the first sound over the entire heart, with point of maximum intensity over second and third

interspaces to left of sternum. It is transmitted through the entire chest and can be heard in the vessels of the neck. A faint second sound at the end of the murmur is heard at the apex and at times over the pulmonic area. The liver extends 1 cm. below the costal margin. She has been under observation for some time; neither rest or exercise seems to exert any influence on the physical signs. There have been no evidences of loss of compensation. X-ray shows enlargement of the right side of the heart with probably slight enlargement of the left ventricle. The left auricle is not enlarged. A tentative diagnosis of defect in the intra-ventricular septum with narrowing of the pulmonary orifice has been made.

ENLARGED THYMUS GLAND.

DRS. H. S. BACHMAN and B. S. VEEDER showed a Yiddish infant of six months with enlarged thymus. There was a distinct stridor present, most marked on expiration, increased when the head was drawn backward. An X-ray plate showed a shadow corresponding to the area of dullness obtained by percussion over the enlarged gland. The baby is to be treated by the X-rays.

DR. FIFE called attention to the great epiphyseal enlargement in the case of rachitis. He believes that, in the case of congenital heart disease, lesions of all the valves can be eliminated, leaving the most probable diagnosis a deficiency of the intraventricular septum, with possibly constriction of the pulmonary artery.

DR. JOSEPH SAILER said that the diagnosis of congenital heart disease is often very difficult. He referred to a case in which there was a loud murmur, powerful thrill over the pulmonic cartilage with accentuation of the second pulmonic sound, but at autopsy the only lesion found was hypertrophy of the left ventricle and chronic kidney disease. The X-ray is not decisive in determining enlargement of the right or left ventricle, especially in children. In the present case he heard clearly the murmur transmitted to the vessels of the neck and not through the solid tissue. This would indicate aortic disease. He considered it rare to have defective septum in pulmonary stenosis without cyanosis, and polycythemia is often present. The pallor in the present case is also suggestive of an aortic lesion.

DR. VEEDER added that the blood count in this case was simply that of slight anemia. While there may be a chance of postnatal

infection in this child, the enlargement of the heart, without any signs of loss of compensation, proves it to be congenital. He thinks that some narrowing of the pulmonic orifice must be present.

UNUNITED FRACTURE OF LOWER THIRD OF TIBIA OF SEVEN
YEARS' STANDING.

DR. RUGH showed a boy of ten years, whose left leg was broken seven years ago, treated by splints, plaster and braces without success. Wiring the bones after a year's time was also unsuccessful. A year later silver plates were used to keep the bone ends in apposition, but extensive suppuration occurred and no results were obtained. When Dr. Rugh operated, two months ago, there was exaggerated forward bending of the tibia at the point of fracture, with short tendo Achillis. This tendon was cut subcutaneously and the leg forcibly straightened. The site of the fracture was then exposed, the bone ends cleaned and a piece of bone and periosteum, three-quarters of an inch wide and two inches long, was cut from the lower end of the upper fragment. This was slipped downward across the break and sewed to a slit in the periosteum of the lower fragment and to the lower end of the upper fragment. The leg was placed in plaster of Paris and union occurred by first intention. There is now a slight degree of fixation to be elicited, and the indications are that a good result will be obtained. This is a modification of Murphy's method, in which he chisels a groove in the lower fragment for the transplanted piece. This case is one of two upon which Dr. Rugh has operated within two weeks of each other, with favorable prognosis in each case.

DR. YOUNG asked what had been done with the fibula, as this bone usually causes trouble in these cases by producing deformity from its more rapid growth. These cases are interesting from the fact that many of them come to the orthopedic surgeon after having passed through the hands of the general surgeon. As a rule, orthopedic surgeons do not desire to treat fractures, since their work is largely with chronic deformities, and they are better qualified to treat these cases after they have existed for some time.

DR. RUGH added that both bones had been broken in this case and he had only freshened up the edges of the broken fibula.

INTUSSUSCEPTION.

DR. HARRY A. SCHATZ, by invitation, showed an infant upon whom operation had been performed at eight months, for intussusception. The attack began with vomiting of everything ingested, severe abdominal pain in paroxysms, frequent bloody stools containing mucus but no fecal matter, scanty urination and shock. The characteristic sausage-shaped tumor was felt in the left iliac fossa and extending upward to the hypochondriac region. Injection of water under pressure per rectum, with the child inverted, failed to relieve the condition. Dr. A. C. Wood operated sixty-five hours after the onset. The lower part of the ileum, cecum and appendix, and the first three inches of the ascending colon constituted the invaginated portion. The bowel was delivered by compressing the large intestine below the site of the tumor. Recovery was rapid and uneventful.

NOMA.—M. Breuer (*Arch. de Méd. des Enfants.*, 1910, p. 666). Noma is a comparatively rare affection. At the Hôpital St. Pierre, Brussels, on the average only 1 case is met with in a year out of a total of 450 admissions. As a rule, it is a sequel of infectious diseases, especially measles. Attempts made to produce noma experimentally by inoculation of certain microorganisms into animals have failed. At most abscesses at the injection site, and sometimes septicemia have resulted. Breuer's own case was in a rickety girl, aged two and one-half years, in whom the complication developed after disappearance of the measles rash. When death took place, a week after the onset of the noma, there was considerable destruction of the lips, tongue, alæ nasi, superior maxilla, vomer, and turbinate bones. At the necropsy were found numerous foci of bronchopneumonia, degeneration of the kidneys, liver and myocardium. In addition to spirilla and different varieties of cocci, bacteriologic examination showed a large number of thick bacilli closely resembling those described by Schimmelbusch in 1889 as present in noma. Breuer concludes that noma is not a distinct disease due to a single germ, but holds that the debility caused by a previous illness, especially measles, prepares the ground for the development of certain microbial associations in which sometimes one and sometimes another microorganism predominates.—J. D. ROLLESTON.—*British Journal of Children's Diseases*.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. CHARLES E. FARR.
DR. S. FELDSTEIN.
DR. ALFRED F. HESS.
DR. C. D. MARTINETTI.

DR. CHARLES OGILVY.
DR. M. C. PEASE, JR.
DR. RICHARD M. SMITH.
DR. FRITZ B. TALBOT.

SURGERY.

PEHU: THE PERIVASCULAR TOPOGRAPHY OF INTESTINAL TUBERCULOSIS IN EARLY CHILDHOOD. (*Archives de Medecine des Enfants*, January, 1911.)

After a series of careful studies, extending over a number of years, Pehu concludes that intestinal tuberculosis is of hemic origin. The tubercles are always found just beneath the peritoneal surface and grouped about the blood vessels. Other arguments in favor of the hemic origin are the known ability of the gastric juice to destroy tubercle bacilli, and the fact that the pasteurization of milk has not diminished intestinal tuberculosis. Moreover, the fact that primary intestinal tuberculosis is so very rare argues against alimentary infection.

CHARLES E. FARR.

KAEMPFER, LOUIS G.: CONGENITAL EPULIDES (ODONTO-BLASTOMATA). (*Surgery, Gynecology and Obstetrics*, April, 1911, p. 357.)

Kaempfer reports a case and reviews the literature of 7 more of these very rare and interesting congenital tumors. They have all been in females and have usually interfered with nursing. In the case reported the tumor was the size of a walnut, of a bluish-red color and bled easily. The mass was firm and was attached to the alveolar process of the upper jaw. The growths are benign and are easily removed. On microscopic examination the tumor is of connective tissue origin, arising from the dental papilla, and contains in about half the cases epithelial tissue, evidently from the enamel organ. Curiously enough, subsequent dentition is rarely interfered with.

CHARLES E. FARR.

VEAU, V.: THYMECTOMY, 10 CASES. (*Bulletins de la Société de Pédiatrie*, Paris, March, 1911, pp. 105-151.)

Veau reports 4 cures by thymectomy, of dyspnea from enlarged thymus. He warns against the common mistake of considering all dyspneas of childhood due to thymus enlargement, since many are due to bronchial glands. Three of his cases were of this nature. Veau, however, would operate even then, if the lung is not involved. He operates only when dyspnea seems to make it necessary, and does not promise to cure the stridor. One child died without operation, from spasm of the glottis, while another was relieved for a month by operation, when the attacks returned less severely, and gradually subsided. He concludes that thymectomy in cases of persisting dyspnea when the patients are strong and otherwise well, is indicated, and that the results in general are good.

CHARLES E. FARR.

RAFIN, M.: CALCULUS IN KIDNEY OR URETER IN CHILDREN. (*Annales des Maladies des Org. Génito-urinaires*, Paris, March 15, pp. 481-576.)

Rafin concludes that operations on the genito-urinary tract in children are relatively well borne. He reports 39 calculus cases in the literature and adds 2 of his own. The stones are apt to be multiple, and the X-rays are of the greatest help. There were four fatal results due to the severe infection. The end results are not well known, and these children should be kept under observation and medical care for a very long time. Of the children reported 5 were under five years of age, 18 between five and ten, and 12 between ten and fifteen.

CHARLES E. FARR.

AVIRAGNET, E. C.: BRONCHIAL GLANDS AND THE THYMUS. (*Bulletins de la Société de Pédiatrie*, Paris, March, 1911, pp. 105-151.)

The case reported by Aviragnet was that of a sixteen-months-old infant giving the typical signs and symptoms of thymus hypertrophy, *i.e.*, inspiratory stridor, dullness, and tumor over the upper part of the sternum, and a radiographic shadow. The dyspnea was partly relieved by a long intratracheal tube. The thymus was removed but was quite small and the dyspnea was not relieved. The child died shortly afterward. The author concludes that enlargement of the bronchial glands is apt to follow a

bronchial pneumonia or whooping-cough and to cause dyspnea, whereas the dyspnea of thymus enlargement is more apt to be present at birth.

CHARLES E. FARR.

SPITZY, D. H.: PROGRESS IN THE FIELD OF SURGERY OF THE PERIPHERAL NERVES. (*Allgemeine Wiener Medizinische Zeitung*, 1911.)

Spitzzy believes in early operations in cases of paralysis of the brachial plexus, since the chances of success are much greater and secondary paralyses and degenerations will be obviated. In anterior poliomyelitis cases the success of a nerve plastic depends entirely upon the amount of nervous and muscular tissue preserved. Whatever spontaneous return is to come will appear within a few weeks of the attack, and operations therefore should be undertaken much earlier than is generally advised. If scarcely any healthy nerve tissue is left, nerve plastics are of no avail, and tendon plastics and arthrodesis should be employed. Nerve plastics are of greatest avail where all the paralyzed muscles are of one group, with a single nerve supply. Central implantation, partial or complete, is the best method.

CHARLES E. FARR.

MARKOE, J. W.: A MODIFICATION OF LANE'S OPERATION FOR CLEFT PALATE AND HARELIP. (*The Bulletin of the Lying-In Hospital*, New York, June 11, 1911.)

Markoe carries out the lines of the Lane operation, except that he raises a flap of mucoperiosteum from the intermaxillary bone and fits it under a flap similarly raised from the opposite alveolus. In this way the arch is completely closed and considerable is gained in forming the anterior part of the floor of the nose.

CHARLES E. FARR.

CASSEL, J.: TUBERCULOUS PERITONITIS IN CHILDREN: 45 CASES. (*Berlin. klin. Woch.*, May 8, 1911.)

Cassel reports 31 cases treated conservatively, *i.e.*, without operation. Eight are cured, 9 have died, and the fate of the others is not known. Of the 14 operative cases, 6 are in good health, while 6 others died within a few weeks of the operation. When climatic and other conditions are favorable, expectant treatment is advised for some time; otherwise he advocates an early operation after some weeks of medical care, even if the condition is still febrile.

CHARLES E. FARR.

PALMER, FRANK A.: CONGENITAL UMBILICAL HERNIA, OR HERNIA INTO THE CORD. (*Surgery, Gynecology and Obstetrics*, June, 1911, p. 526.)

Palmer reports one of these comparatively rare cases and gives a brief résumé of the literature. About 100 cases have been reported in modern times. Where the displacement of the abdominal organs is great the mortality is very high, as, for example, when the bladder, the greater part of the liver, or even the heart, is in the sac. Death is due not only to the prolonged and difficult operation and the abnormal condition of the organs, but to the disproportion between the mass of the organs and the size of the abdominal cavity. The author, therefore, divides the cases into two groups—(1) the simple, in which the hernial contents consist of only intestine and not over one-quarter of the liver, and (2) those cases in which the whole of the liver, or other organs, are involved. The mortality in the simpler cases is only about 33 per cent., but is very high in all the other cases.

Palmer thinks that the cause of the hernia is the persistence of the vitelline duct in some cases, or by adhesions between the intestine and the surrounding structures. The first coils of the primitive gut, which are formed outside of the abdominal cavity, are thus prevented from retracting into the abdomen. The author's case was a female five hours old, a twin, in which there was a hernia into the umbilical cord eight inches long and sixteen in circumference, containing intestine covered only with the transparent membrane of the cord. Chloroform was given, the contents reduced by taxis, with the exception of one loop of small intestine, which would not go back. On opening the sac this loop was found adherent to the peritoneum just within the ring. The adhesions could not be broken up. Palmer, therefore, split the cuff about the base of the hernia into an inner and an outer layer and sutured the inner layer, consisting of Wharton's jelly and peritoneum, in a vertical direction. The outer layer of skin only was sutured transversely. Complete recovery and a permanent cure resulted, with a firmly closed ring and normal umbilicus, without scar. The author's contention is that we can rely upon the well-known tendency of these openings to close spontaneously, provided the contents of the sac have been reduced.

CHARLES E. FARR.

EISENDRATH, DANIEL N.: CONGENITAL STENOSIS OF THE URETER. (*Surgery, Gynecology and Obstetrics*, June, 1911, p. 533.)

The author reports at length the case of a boy of fourteen who, without previous symptoms, was suddenly attacked with nausea and severe pain in the left flank, which was not relieved by opiates. After two days there was retention of urine with slight fever. The diagnosis was not made and no masses felt until the boy was etherized. The ureter was found to be greatly distended, pale blue in color, lying along the inner side of the colon. The abdomen was closed, and the usual posterior incision was made. The stricture was one and a half inches above the bladder, the ureter below being firm and cordlike. It was opened and considerable straw-colored fluid escaped. Two valves were found also about two inches below the kidney and a distinct narrowing at the juncture of the ureter with the pelvis of the kidney. The lower stenosis was not complete, as a catheter could be passed into the bladder. The ureter was drained, but the temperature continued to rise and the kidney and the ureter were later removed. There was a septic pyelonephritis and a moderate hydro-nephrosis. Recovery was uneventful.

Another operative case with recovery is mentioned and a third postmortem case is described. There is a fairly complete review of the literature and some very good illustrations.

CHARLES E. FARR.

RICHTER, H. M.: PYLORIC STENOSIS IN INFANCY. (*Surgery, Gynecology and Obstetrics*, June, 1911, p. 568.)

Richter gives a résumé of the literature and goes into detail in the matter of diagnosis and surgical treatment. He reports 11 operative cases—2 of the spasmodic, 9 of the hypertrophic type. In all posterior no-loop gastrojejunotomy was done, with one exception, in which the anterior colic but posterior gastric operation was performed. There was 1 operative death and 1 case died later on of food intoxication. Of the 7 earlier cases the 6 that are alive are all in perfect physical condition and normal weight, or above. One case developed an acute obstruction from volvulus, and was operated upon a second time; the wound opened later with partial evisceration, but complete recovery ensued. Another case developed intestinal obstruction from ad-

hesions due to leakage probably, and here also complete recovery followed the secondary operation. None of the living cases shows any evidence of intestinal disturbance. The stools are normal, well digested and regular. Richter lays his remarkable success to early operations, supervision by a pediatricist after operation and technic of the operation itself. He makes a strong point of the use of very fine silk in the operations, of thorough protection of the child from cold and of the introduction of water into the jejunum at the close of the operation by passing a tube into the stomach and on into the intestine. A number of very excellent photographs of the cases are given.

CHARLES E. FARR.

MITCHELL, J. P.: A RARE CASE OF CONGENITAL UMBILICAL HERNIA. (*Lancet*, London, May, 1911.)

In the case reported by Mitchell the hernia was the size and shape of a cocoanut, and contained the whole of the left lobe and the greater portion of the right lobe of the liver. Replacement was difficult because of the attachment of the round ligament, but when this was cut the liver fell back into position. The muscles were sutured with silk-worm-gut, the umbilical vessels were ligatured and the skin trimmed and sutured, making a vertical wound. Although the wound healed by granulation there has been no tendency to a return of the hernia.

CHARLES E. FARR.

ORTHOPEDIC SURGERY.

BRADFORD, E. H.: THE OPERATIVE TREATMENT OF PARALYSIS OF THE SHOULDER FOLLOWING ANTERIOR POLIOMYELITIS. (*The American Journal of Orthopedic Surgery*, August, 1910, p. 21.)

Dr. Bradford reports 7 cases. The operation performed was a periosteal insertion of a portion of the trapezius into the point of humeral insertion of the deltoid. The insertion was made in all cases by a silk strand quilted into the belly of the freed portion of the trapezius and stitched into the periosteum at the point of insertion of the deltoid on the humerus, the arms being elevated in order to place the transferred muscle in a state of tension.

In concluding Bradford summarizes the conclusions which his experience gained in these cases justifies as follows:

1. Muscle transference under proper conditions can be made to improve the usefulness of the arms.
2. Firm attachments on the humerus and at the scaphoid are indicated to secure permanent benefit.
3. The place for the insertion will vary in each case, at the discretion of the surgeon, as is true also for the part and extent of the muscle to be transferred.
4. Attachment of a portion of the proximal fascia of the trapezius and the scapula improve the result.

CHARLES OGILVY.

MEDICINE.

ROSENAU, M. J., SHEPPARD, PHILIP A. E., AND AMOSS, HAROLD L.: ANTERIOR POLIOMYELITIS. ATTEMPTS TO TRANSMIT THE DISEASE TO MONKEYS BY INOCULATION WITH THE NASAL, PHARYNGEAL AND BUCCAL SECRETIONS OF 18 HUMAN CASES. (*Boston Medical and Surgical Journal*, May 25, 1911, p. 743.)

The fact that the virus of epidemic poliomyelitis was not demonstrated in the buccal and nasal and pharyngeal secretions of 18 cases is not proof that it may not have been there. In any event, the virus would have been greatly diluted, owing to the relatively large amount of salt solution used to wash the mucous membrane. Furthermore, under the conditions of the experiment, the virus may have been so attenuated as to be incapable of infecting monkeys. It is well known that a considerable quantity of the virus from the central nervous system of man is sometimes required to initiate the infection in monkeys. Our results must not be construed as in any sense disproving the assumption that the infection in this disease may be discharged from the mucosa of the upper respiratory passage and enter through the same channel.

FRITZ B. TALBOT.

LUST, F.: THE WATER CONTENTS OF THE BLOOD IN NUTRITIONAL DISTURBANCES OF INFANTS. (*Jahrb. für Kinderhk.*, January, 1911.)

The blood of infancy contains more water than that of older children and adults. The average per cent. is 82, which is 3-4

per cent. more than in later life. In the first few weeks of life, however, the water contents is even less than that of adult life. The blood of the artificially-fed contains somewhat more water than that of normal breast-fed babies. The rapid gain in weight the first few weeks of life runs parallel with the increase of water in the blood, indicating that there is a corresponding increase in the amount of water in the tissues. When the proper concentration has once been attained, it remains practically constant throughout infancy. The concentration of the blood is maintained even in acute nutritional disturbances if not too severe in nature. Even severe diarrhea produces only a temporary change. When great loss of water occurs, especially if associated with intoxication, the blood becomes more concentrated. But before death the blood may become hydremic once more, as a result of loss in dry substance. Intoxication may produce concentration of the blood even in the absence of watery diarrhea. In chronic disturbances no marked change occurs. In the stage of convalescence from acute diseases, the gain in water runs for a time parallel with gain in weight. Gain in weight as a result of ingestion of carbohydrates is accompanied by more or less increase in the water contents of the blood. When this is absent it indicates that this kind of nourishment is unsuited for production of repair. Ingestion of salt gave no uniform results as regards the blood concentration. During the disappearance of edema the blood remains hydremic.

S. FELDSTEIN.

MORSE, JOHN LOVETT: MENINGITIS IN INFANCY. (*Boston Medical and Surgical Journal*, May 18, 1911, p. 701.)

Seventy-five per cent. of the cases of tuberculous meningitis occur during the first five years of life, and more cases occur during the second year than at any other time. Cerebrospinal meningitis is more common in childhood than in later life and is especially common in infancy. When cerebrospinal meningitis is not epidemic at least 70 per cent. of the cases of meningitis in infancy are tuberculous. A large majority of the others are meningococcal in origin. If the disease is due to some other organism, the symptoms are likely to resemble those of cerebrospinal rather than those of tuberculous meningitis. The diagnosis between meningitis and nervous symptoms due to cerebral irritation is usually

easy when the fontanel is open. The fontanel is almost invariably bulging when there is meningitis. The examination of the blood is of some, but not of much, assistance in the differential diagnosis. There is an increase in the number of white corpuscles in almost all cases of cerebrospinal meningitis. There is no increase in most cases of tuberculous meningitis. The tuberculin test is of some importance. If positive at this age it is strong, but not conclusive evidence in favor of tuberculous meningitis. In the vast majority of cases a positive diagnosis can only be made by lumbar puncture. The prognosis of cerebrospinal meningitis in infancy before the introduction of the serum treatment was practically hopeless, the mortality being between 85 and 100 per cent. This has been materially changed, however, by the serum treatment. Flexner and Joblin, for example, report a mortality of 19 in 44 cases or only 43 per cent. One of their cases which recovered was only four weeks old.

Pneumococcus meningitis usually develops in the course of lobar pneumonia, but the symptoms of meningitis sometimes precede the signs of pneumonia by several days.

Influenza meningitis cerebrospinal fluid is very turbid or purulent and the cells are almost all polynuclear. It almost always contains a large number of influenza bacilli. Influenza meningitis usually runs a short course and is almost invariably fatal. Treatment can be only symptomatic.

Fritz B. Talbot.

STEPHENSON, SYDNEY: ON THE OCULOMOTOR TYPE OF POLIOENCEPHALITIS. (*The British Journal of Children's Diseases*, April, 1911, p. 10.)

Dr. Stephenson has collected 28 such cases, and after carefully considering them draws the following conclusions:—

(1) There is a particular form of paralytic strabismus in children which is due to polioencephalitis.

(2) It is not uncommon, and is most frequent in children under one year of age.

(3) It is associated comparatively seldom with other symptoms of cerebral disorder.

(4) Zymotic diseases appear to be important factors in its causation.

(5) Although the paralysis may affect any of the extrinsic

muscles of the eyeball, yet in three-fourths of the cases the external rectus muscle is alone involved. The extrinsic musculature of the eye is seldom attacked.

(6) The common form of encephalic strabismus is very apt to be confused with the ordinary form of concomitant convergent strabismus.

M. C. PEASE, JR.

BLAUNER, S. A.: SPASMOPHILIA DIATHESIS. (*The Medical Times*, May, 1911, p. 138.)

Dr. Blauner defines spasmophilic or tetanoid diathesis as a constitutional anomaly, finding its expression in a prolonged or transient tonic spasm of either several or all the muscles of the body based on a hyperirritability of the central nervous system. Convulsions, tetany and contractures are extreme symptoms and occur usually in aggravated and neglected cases. Galvanic irritability is of great diagnostic importance. It is a constant symptom, and is not infrequently the only one. Laryngospasm is present in nearly all of the cases. Chvostek's and Trousseau's symptoms can, in most cases, be elicited.

It is interesting to note that Dr. Blauner finds that spasmophilia occurs almost invariably in artificially-fed infants in early life. It is rarely seen before the third month, and is not common after the third year.

Treatment consists in a milk-free diet. No milk should be given until all the symptoms have disappeared, for not infrequently even a minute quantity causes a recurrence of the symptoms. The return to a milk diet should be made with the greatest caution. It is wise to test the infant with one teaspoonful of milk, and if there is no return of symptoms after the first twenty-four hours to add a teaspoonful of milk to each feeding. If this is well borne a rapid return to the normal feedings may be made.

M. C. PEASE, JR.

COOMBS, C. F.: THE NATURE AND TREATMENT OF CHOREA. (*The Bristol Medico-Chirurgical Journal*, March, 1911, p. 51.)

Dr. Coombs believes that chorea is a manifestation of rheumatic infection. Out of 227 cases observed over a period of from a few weeks to five years, 172 (or 76 per cent.) either give a rheumatic history or show definite evidence of rheumatic infection.

He gives the following summary of the pathology, symptoms and treatment of chorea.

SUMMARY.

(1) Sydenham's chorea is a manifestation of rheumatic infection.

(2) It is an organic disease of the brain, attacking all parts of the cortex equally and impartially, but affecting the basal grey matter less severely.

(3) Consequently the symptoms are not only motor, but also psychical and sometimes sensory.

(4) The motor symptoms are partly due to loss of inhibition, partly to cortical irritation.

(5) In chorea the fallacy of the distinction between "functional" and organic nervous disease is exemplified.

(6) Chorea can be fatal without the occurrence of meningeal inflammation.

7. This fact, with the phenomena of latent chorea, suggests that chorea may be due to direct intoxication rather than gross infection of the cranial contents.

(8) The tendency of chorea is toward restoration of health to the brain.

(9) Treatment consists of (a) removal of the cause, active rheumatic infection, by rest in bed with administration of salicylates during the active stages; (b) prolonged mental and bodily rest during convalescence; (c) improvement of general health by fresh air, full diet, and tonics; (d) quieting of excessive movement by sedative drugs or packs, and cure of paresis by massage.

(10) The full-dose arsenical treatment is useless.

(11) Chloretone is only useful in certain cases, and should not to be given as a routine measure. M. C. PEASE, JR.

WILCOX, HERBERT B.: THE DIAGNOSIS OF INFANTILE TETANY. (*American Journal of Diseases of Children*, 1911, Vol. I., p. 398.)

The author studied the muscular response to galvanic stimulation, first in normal infants, second in infants with tetany, third in normal dogs, and fourth in dogs deprived of part or all of their parathyroid tissue. The type of tetany is that accompanied by great general irritability, laryngospasm and respiratory spasm, with or without convulsions. The electrical diagnosis depends

on the obtaining of a muscular response to galvanic stimulation with anodal and kathodal closure and opening of a current strength of less than 5 milliamperes. Normal children react to kathodal closure alone. Many children not having tetany give a low response to anodal closure and a few to anodal opening. This slight variation from the normal may be due to the early stages of tetany or to some other cause. Tetany was found in about 2 per cent. of infants under one year of age. The highest incidence is during the early months of the year. Chvostek's and Trousseau's sign were not constant phenomena. In normal dogs the reactions are the same as in normal children. Complete extirpation of the parathyroid glands produces prompt hyperirritability to galvanism. Partial extirpation produces anodod irritability or inconstant change. Electrical changes always precede the other symptoms of tetany by a considerable time.

RICHARD M. SMITH.

CARDAMATIS, L.: INFANTILE MALARIA (LA PROPAGANDA ANTIMALARIA). (Fifth Pamphlet, 1910.)

(1) During infancy there appears to be less liability to malarial attacks than in subsequent periods.

(2) Nursing infants up to three months of age rarely contract malaria.

(3) Up to one month they are practically immune.

(4) Compared with children of other ages the mortality under one year is small, probably on account of the use of mosquito netting to protect the infants.

(5) Children in the second and third year are equally liable to contract the disease.

C. D. MARTINETTI.

KOHNER, J. A.: THE DIAGNOSTIC VALUE OF A BLOOD EXAMINATION IN PERTUSSIS. (*American Journal of Children's Diseases*, 1911, Vol. I., p. 431.)

The blood of 43 patients convalescent from scarlet fever and suspected of having pertussis was studied. Out of 37 cases of cough, which could not be diagnosed clinically from pertussis, 16 proved later to be pertussis. Of these 13, or 81.25 per cent., were correctly diagnosed and 3, or 18.75 per cent., incorrectly diagnosed, by examination of the blood. Of the 21 cases not proving to be pertussis, 15, or 71.4 per cent., were given the cor-

rect, and 6, or 28.6 per cent., the incorrect diagnosis. The proved cases of pertussis showed a high leukocytosis and lymphocytosis in the paroxysmal stage, with a gradual decrease toward the stage of improvement when the cough is paroxysmal but without the whoop. The presence of a secondary infection, as scarlet fever, which may itself produce a leukocytosis with a relative or actual decrease in the small lymphocytosis, will lead to error. In such cases it is better to be guided by the total number of leukocytes in a c.c. of blood than by the differential count.

RICHARD M. SMITH.

GHETTI, D.: CEREBRAL HEMORRHAGE IN INFANCY. (*Gaz. Osped.*, No. 87.)

An interesting clinical history is that of a boy of eight years admitted to the City Hospital of Faeuza with pronounced symptoms of cerebral hemorrhage. As such cases are extremely rare and the differential diagnosis hard to make, the author considered the possibility of a tubercular process and of a cerebral abscess that might have followed a serious attack of otitis media. There never was, however, any temperature. An autopsy revealed cerebral hemorrhage, possibly due to hereditary syphilis.

C. D. MARTINETTI.

PHYSIOLOGY.

KLOSE, H.: "EXPERIMENTAL STUDIES ON THE THYMUS AND ITS IMPORTANCE IN PEDIATRICS." (*Archiv. für Kinderhk.*, Vol. LV., Parts 1 and 2, p. 1.)

This important paper, practically a monograph, presents a clinical and experimental study of the thymus. That enlargement of the thymus can produce well-marked symptoms has been recognized for many years. In most of the cases the condition is present at birth or develops within the first few months of life. The most marked symptom is a continuous respiratory stridor, accentuated at the end of inspiration and accompanied by supra-sternal and substernal retraction. At longer or shorter intervals there occur paroxysmal attacks of tracheal stenosis which may result fatally. In other cases compression of the esophagus and resulting dysphagia or compression of the larger vessels of the neck may occur.

Percussion is not very valuable in the diagnosis on account of its uncertainty, while radiography must not infrequently be desisted from on account of the excitement which this procedure often produces in the infant. The diagnosis of thymic enlargement is based on chronic symptoms of compression of the deeper organs of the neck, the occurrence of paroxysmal exacerbations, and the protrusion of a tumor in the jugular fossa during expiration. The presence of these symptoms demands early operative interference, so that a fatal issue during one of the exacerbations of the stenosis due to thymic congestion or even hemorrhage may be averted. Intubation and even tracheotomy are of no permanent benefit. The preferable operation is intracapsular dislocation and ectopexia. The procedure is readily performed and in most cases leads to permanent cure. In case of failure enucleation of the left lobe or excision should be performed. The author collected 23 operative cases from the literature. A cure resulted in 19 cases, improvement in 1. In the 3 fatal cases the operation was performed too late.

The author completely removed the thymus in fifty-four dogs, at the end of the tenth day of life, *i.e.*, at the period of the maximum growth of this organ. Removal at a later period, as practiced by Basch, Hart and Nordham, greatly lessens the experimental value of the results, as the thymus rapidly undergoes involution soon after the tenth day. For two to three months after removal of the thymus, the growth was about the same as that of the control animal, the appetite, however, was enormous; the muscles became flabby and infiltrated with adipose tissue, and fatigue on muscular movements more and more marked. The bones became more elastic. After this period, loss of weight became more and more marked, the growth was stunted, spontaneous fractures developed, coarse muscular tremor was present, the hair fell out and the appetite was voracious. The animals became idiotic, and finally succumbed at the end of six to seventeen months in a state of coma. The most marked changes were in the bones, which showed the characteristics of rickets, osteomalacia and osteoporosis. The striking chemical change was a reduction of fully 75 per cent. of the normal calcium salts of the skeletal system. The normal proportion of the calcium phosphates and carbonates however was unaltered. The loss of calcium salts is attributed by the author to the solvent action of

free nucleinic or phosphoric acid in the blood. The function of the thymus at this period of life is assumed to be the conversion of these acids which are the result of cell metabolism into the harmless nucleinates. The removal of the thymus prevents this detoxicating action. The galvanic hyperirritability and the edematous condition of the brain present in the thymectomized animals are also explained by the presence of acids and decrease of calcium salts. The symptoms present in lymphatism, some forms of idiocy and tetany may possibly be due to disturbed function of the thymus. The enlargement of the spleen, the presence of a large number of follicles and the active karyokinesis soon after the removal of the thymus would seem to point to the assumption of the functions of the thymus by the spleen. In the treatment of these conditions, administration of thymus gland is useless, as the detoxicating action can only be the function of a living organ.

S. FELDSTEIN.

COBLINER, S.: AN EXAMINATION OF THE BLOOD OF INFANTS FOR SUGAR. (*Zeitsch. f. Kinderhk.*, Bd. I., No. 3, p. 207.)

In some nutritional disturbances of infants sugar is excreted in the urine. As in such instances in adults, sugar is also found in the blood; the author tested the blood of infants, using a new method, which requires but a small quantity of blood for this examination. He found that, physiologically, infants have a higher sugar content in the blood than adults, excepting during the first few weeks of life, during which period both have 0.085 per cent. on an average. A hyperglycemia was found in cases of exudative diathesis, in cases of "decomposition," and in those in which salt fever was produced. In dyspepsia and cases of "intoxication" (Finkelstein's nomenclature) no exaggeration in the sugar content of the blood was found.

ALFRED F. HESS.

THERAPEUTICS.

BAETZNER, W.: TRYPSIN TREATMENT OF SURGICAL TUBERCULOSIS. (*Archiv. für Klin. Chirurg.*, Vol. XCV., Part I.)

The author, with Jochman, first advocated the use of trypsin in surgical tuberculosis in 1908, and now brings forward the re-

sults of other experimenters and his own later results. He finds that the trypsin solutions give excellent results in tuberculous lesions of the soft tissues, fistulæ from broken-down glands, tenosynovitis, and tuberculosis of bones and joints.

Trypsin, while innocuous as compared to iodoform in glycerin, gives much quicker and more permanent results with much less marked local and general reactions. It may be used in all ambulant cases, and in some cases will cure the lesions without the use of other forms of treatment.

CHARLES E. FARR.

JOCHMAN, G., AND MOELLERS, B.: THE TREATMENT OF TUBERCULOSIS WITH ALBUMOSE-FREE TUBERCULIN. (*Deutsch. med. Woch.*, 1911, No. 28, p. 163.)

The authors, pupils of Koch, and following the great master's instructions, have prepared a tuberculin which contains only such albuminous material as the tubercle bacillus itself elaborates, or is formed from autolysis of the bacilli. The organism is grown on media deprived of albumose. This tuberculin, the authors claim, is less toxic than old tuberculin, causes little or no reaction, can be increased rapidly in its dosage, and is very efficacious. This preparation no doubt will be granted an extensive trial. It must be noted, however, that, like all previous tuberculin preparations, this one is unable to produce antibodies in the living organism—the bacilli themselves seem necessary to produce this reaction with regularity.

ALFRED F. HESS.

ROSENSTERN, I.: ON THE QUESTION OF A DIET POOR IN SUGAR AND RICH IN FAT. (*Zeitsch. f. Kinderhk.*, Vol. II., No. 6, p. 481.)

For a gain in weight carbohydrates have been considered necessary. Rosenstern increased the fat percentage in the food of a number of infants to see whether fat could take the place of carbohydrate if increased sufficiently. He found that sugar cannot be replaced by isodynamic amounts of fat; that it was necessary to give more fat than the corresponding number of calories of sugar. However, if this were done fat could replace sugar in the diet and result in a gain of weight. The gain was not as rapid as when an equivalent amount of carbohydrate was taken, and signs of nutritional disturbances always supervened.

ALFRED F. HESS.

BOOK REVIEWS.

A MANUAL OF DISEASES OF INFANTS AND CHILDREN. By JOHN RUHRÄH, M.D., Clinical Professor of Diseases of Children, College of Physicians and Surgeons, Baltimore. Third revised edition. 12mo volume of 534 pages, fully illustrated. Philadelphia and London: W. B. Saunders Company, 1911.

Dr. Ruhräh calls this book a manual to be used for rapid reference by the third and fourth year students who have not the time always to consult the larger works of the diseases of children, and with characteristic modesty hopes that it is not too condensed to be of service to the busy practitioner. Would that every busy practitioner—and every pediatrician—knew enough about the diseases of children to regard it as condensed! Few large treatises on this subject are as readable, as well arranged, or as well illustrated as is this manual, and no manual that has come to our notice gives so little the impression of being a short cut to knowledge. The essentials of the subject are presented, but where the essentials take up space, space is given. The articles on infant feeding are longer than in some supposedly thorough text-books. The section on the blood is unique and worth buying the book for alone. The division on therapeutics might be read with profit by the most experienced pediatrician. We know of no more intelligently illustrated book on children's diseases, which is perhaps due to the large number of photographs taken by the author and representing actual cases. While one might not agree with everything that Dr. Ruhräh writes, in the matter of milk modification for instance, yet one would not change it at all, for the book is his and expresses his ideas. We recommend this "manual" to everyone, confident that its perusal will be richly rewarded.

THE MEDICAL DISEASES OF CHILDREN. By REGINALD MILLER, M.D. (Lond.), M.R.C.P., Physician to Out-patients, Paddington Green Children's Hospital; Assistant Physician to Out-patients, St. Mary's Hospital; Late Medical Registrar and Pathologist, Hospital for Sick Children, Great Ormond Street. Bristol: John Wright & Sons, Ltd., 1911.

This is a comparatively small book in which to attempt to cover the subject of pediatrics, the entire text covering but a little over five hundred pages. On perusal of these pages, however,

one is struck by the enormous amount of material which has been condensed into this small space. Not only are the commoner diseases of childhood covered in a concise but thorough manner, but even the exceptional and rare affections also receive full consideration. The articles are short, pithy and exactly to the point. Space is not wasted on vain discussion, but the accepted facts and the probable theories are brought thoroughly up to date. In the case of the theories the propounder is mentioned by name. Perhaps the most interesting feature of this book is the arrangement of the chapters. England has long been known as the country in which the scattered knowledge of other peoples is most apt to be collected and illuminated by the broad light of comprehension. In this way our British brothers are ahead of us in acknowledging the broader aspects of disease. This is brought out by the recognition in the present work of the great disease groups, as the pneumococcal disease, including pneumonia, peritonitis, meningitis, otitis, etc., and the rheumatic infection under which is classed such diseases as chorea and erythema nodosum. When under such classification one finds the separate diseases thoroughly and briefly discussed when one finds in a few pages the facts desired about both common and rare diseases covered by a man who through his association with the Great Ormond Street Hospital has had abundant opportunity to study pediatrics in all its ramifications, and finds the subjects well illustrated by excellent photographs which really show vividly the especial features to be demonstrated, one must admit that the work of author and publisher has been a success. The book may well prove of value to the student and practitioner alike.

BOOKS RECEIVED.

MEDICAL REVOLUTION. A PLEA FOR NATIONAL PRESERVATION OF HEALTH, BASED UPON THE NATURAL INTERPRETATION OF DISEASE. By SYDNEY W. MACILWAINE, M.R.C.S., L.R.C.P. (Retired). London: P. S. King & Son, 1911.

HIERONYMUS FRACASTOR'S SYPHILIS. From the Original Latin. A Translation in Prose of Fracastor's Immortal Poem. St. Louis, Mo.: The Philomar Company, 1911.

ARCHIVES OF PEDIATRICS

OCTOBER, 1911.

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

THE SUMMER VACATION—AND AFTER.

These autumn months have been bringing their thousands home from the seashore and mountains and making our summer empty towns fuller and fuller of people. On the faces which one sees among the crowds in the streets there is an air of general well-being, of vigor and alertness, of a latent energy which must surely accomplish a great deal of one kind or another during the winter. Seeing these and thinking over the philosophy of taking vacations, one comes into full accord with the idea that a certain amount of play does surely make Jack much less a dull, if not actually a bright boy, and so one becomes enthusiastic and apostrophizes the country, the clear air, the fresh milk, the sweet water, the rural simplicity of life, and if he has not had such a vacation, kicks against the pricks of enforced residence in the crowded town and hates "the torrent of the living down Broadway."

To the physician, however, the high lights and shadows of this picture are not so uncompromisingly black and white. He sees the erect carriage and sturdy shoulders which five weeks in the Hudson's Bay country have produced, he delights in the clear

quiet of the eye that has been looking from peak to valley and from valley to peak in the Sierras, and he knows that a certain bronzed cheek has been enduring the wind and sun off Mount Desert, and all of it seems good to him, for he believes in vacations. But he sees other faces far different and not among the crowds in the streets, nor destined, some of them, ever to be again. He sees them thin, pale as the pillow they lie against, suffering, perhaps delirious or unconscious, the faces of those sick or recovering from the typhoid or dysentery which has been the contribution of their vacations to their lives. Is it a wonder, with the experience which we doctors have every Fall, that we look on the summer as a time of danger and of dread in many ways?

Few of us perhaps approve of the cities. Their noise, dirt, bustle and nervous strain we inveigh against both in our medical weekly and our popular weekly articles, but there is the other side. Our towns may be crowded, our streets may be dusty, we may have to exchange concrete and asphalt for gravel paths and grass plots, but on the whole in the towns there is a conscious and intelligent effort made toward sanitary living. Our water supplies are safeguarded, our milk is carefully watched, our sewage is disposed of properly. Our fears of the dangers of crowding, dust and of other people have made us active in all that will protect us from them.

In the country the air is nearly free from bacteria, crowding is not excessive, wounds heal quickly, dirt is "clean dirt." The inhabitant of the country village does not have to think so much of how he shall avoid infection and infecting his neighbor. He drinks water from wells and springs, and employs the simplest methods for the disposal of sewage. He suffers little if the hands which milk his cows are not clean, for the bacteria are few and they get little chance to grow. If he and his brothers and sisters survive infancy and childbirth, they usually live to a ripe old age. He sees little reason, therefore, to adopt the finicky notions of the city folk.

It is just the natural advantages of the country community which make it a menace to the city dwellers when they congregate in any numbers in summer resorts. The people in charge of such places, with exceptions of course—but fewer exceptions than one would think—not having to contend ordinarily with many bacteria or the products of a large number of people, have not acquired that education in these matters which is a life or death

essential to the health of a city. Consequently the apparatus for handling summer visitors is seldom adequate and when directed with the obstinate ignorance of many summer resort proprietors is only too liable to break down, with disastrous results.

Certain portions of the seaside summer residence area about New York are notorious for the constant presence of dysentery during July and August. In certain villages and on certain lakes in the mountains of New York typhoid fever is endemic, and people have grown callous to its constant occurrence among their inhabitants. One Adirondack lake has been mentioned many times in the records of the State Department of Health for the amount of sewage delivered into a certain point where traffic is great and where every summer typhoid fever makes its appearance. Farm hands convalescent from typhoid and doubtless still excreting bacilli have been known to be employed in garden patches or as guides to summer visitors to whom they presented the disease. An epidemic of typhoid has been determined to have originated from a carrier who deposited his excrement in a place from which flies could carry contamination to other people's food. Helpers sick with scarlet fever have been found milking cows or washing milk cans. Drinking water often called "spring water" has been known to be taken from wells whose curb was twenty feet below sources of contamination, or from lakes into which sewers empty not a hundred yards away. Instances of this kind might be multiplied without end if the experience of the many could be here set down.

However it is not so much that these things have happened which makes the danger to vacationists. They may never occur again where they have once occurred, but they are liable to occur, because the ignorant or wilful disregard of proper sanitary precautions will persist. One cannot expect a mountain guide turned hotel keeper to approach the problems of the care of his guests in the spirit or with the point of view of a health officer. He will not realize that the primitive arrangements which were satisfactory with a few campers are not sufficient for a population of fifty to five hundred until some epidemic or other ruins his year, and, reaching his brain through his pocketbook, makes him call in the advice of someone who knows.

We do not pretend to say that there are not summer resorts which are healthful and sanitary. There are such. There are some even where there is perfect sanitary control, and happy is

the father whose children are in such places. For the great majority of advertised resorts, however, there is absolutely no guarantee that water supplies are uncontaminated, that milk is even reasonably pure and that the sewage is properly disposed of. Hence the pale, sick faces that we physicians see every Fall.

A few things at least should be done. No hotel, inn or camp, large or small, taking paid guests should be allowed to do business until the sanitary conditions have been investigated and approved by the State Boards of Health; and the standards of such boards should be uniform. The boards also should have police power to enforce proper measures, and not merely inspect and expose and leave unchanged. Together with the certificate from the State Board of Health of sanitary fitness, there should be published and displayed prominently a complete description of the methods for securing proper conditions, so that the ordinary lay guest, whose common sense is often more penetrating than the medical sense of certain health officers, may satisfy himself that his children's health and his own is being properly safeguarded. The law should place penalties for violations, and persons who have contracted illnesses should be able to recover damages, if it can be shown that any violations of proper conditions have existed.

Now, what can we physicians, whose greatest interest is in the illnesses of children, do to help cut down the amount of illness due to the summer vacation?

We can first investigate the sanitary arrangements of the places to which we happen to go ourselves and, according to the results and the openness with which the inspection is allowed, rate the place for ourselves and others. Then a sort of clearing house for information of this character can be established at our county or state medical societies, which would take on somewhat the character of our milk certifying committees, but only in regard to summer resorts. Again, we can get our patients likewise to gather information, and we can write to the places where our little patients are likely to go, and, on the basis of granting or withholding our sanction to their going, obtain information which may be later verified as to its accuracy.

We can do a good deal in this way, and it may be the beginning of a larger movement which shall secure decently healthful places for our much-needed yearly rest.

ORIGINAL COMMUNICATIONS.

THE RADICAL REMOVAL OF THE TONSILS AND ADENOIDS.*

BY CHARLES G. KERLEY, M.D.,

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During the past ten years I have performed the operation for the removal of tonsils and adenoids 371 times in private practice. All but one were my own patients. A much larger number have been operated in hospital and out-patient work. These are not included in this article for the reason that many could not be followed so as to know the ultimate results.

Until eighteen months ago the method of procedure was to remove as much of the tonsil as possible by firm pressure with the tonsillotome and counter pressure by an assistant, but without any attempt at dissection or complete removal of the tonsil. This resulted in the removal of perhaps two-thirds or seven-eighths of the tonsil, leaving the capsule and some tonsillar tissue. The great majority of my cases so operated upon were benefited permanently, that is, benefited somewhat. In others the benefit was very temporary, the tonsil soon assuming the former size, the new growth showing connective tissue changes and adhesions to the pillars, which made the conditions worse than it was before the operation. Even in the cases in which a regrowth of the tonsil did not occur we had the same tendency to tonsillitis and the tonsil as a portal of entry for bacteria continued to be an active agent. Further, second and third operations have been necessary under this procedure. I have performed the second operation after different operators as well as in my own cases.

It is not particularly flattering to be told that the tonsils which *you did not remove* have returned, with emphasis on the *did not*, and all men who have operated much by the above method have had this experience.

I had for some time appreciated the desirability of a com-

* Read at the Twenty-third Annual Meeting of the American Pediatric Society, Lake Mohonk, June 1, 1911.

plete removal of the tonsil, but had been unfavorably impressed with the method employed. The elaborate dissection with many instruments, the deep and prolonged anesthesia, the large loss of blood, the resulting prostration and the slow convalescence made an operation, the severity of which was not warranted in the results attained. It was, accordingly, with a great deal of interest that I learned that a method of *finger enucleation* was being carried on by Dr. Frank S. Mathews, of New York City. Later, December, 1908, Dr. Mathews described this operation in the *Annals of Surgery*. The method advocated occasioned a good deal of adverse comment, and I did not begin to practice it generally until eighteen months ago.

Forty-eight hours before the operation 10 grains of lactate of calcium is given three times daily, the last 10 grains being given after 8 ounces of chicken broth on the morning of the operation. I am convinced that the lactate of calcium lessens the amount of hemorrhage. The method of procedure is as follows and differs but little from that of Dr. Mathews. Ether or gas-ether anesthesia is used. The anesthetic is given to the point of abolishment of the corneal reflexes. The child is gagged sufficiently to allow the entrance of and to give the index finger free play. Our object is to perform a tonsillectomy to strip the tonsil from its bed. For the right tonsil I pass my right index finger into the mouth, and with moderate pressure and finger point dissection pass the finger into the superior fossa at the junction of the anterior and posterior pillar. I thus go in above the tonsil, work down behind the capsule, pull the tonsil downward and with pressure exerted first anteriorly and then posteriorly separate it from its attachments until it hangs by a pedicle formed by the mucosa and blood vessels. Over this as small a tonsillotome as will engage the tonsil is slipped. The anesthetist makes firm pressure from without and the operator with firm pressure on the tonsillotome within cuts the pedicle. No tonsil tissue is cut. The blood vessels in the pedicle contract readily without the interference of firm connective tissue.

Mathews places the gag to the opposite side from that which is to be operated. I do not find this necessary except in very young children or in those with small mouths.

For the left tonsil exactly a similar procedure is carried out, excepting that the left finger is used. I have had but little difficulty in removing the entire tonsil by this method.

The 371 cases represent every type of tonsil. The deeply imbedded strip out as readily as those more superficially placed. The duration of the entire operation, including the anesthesia, rarely requires more than six minutes, and this includes the removal of the adenoids which may be present. In order to do thorough and rapid work the anesthetist must be not only expert, but accustomed to work with the operator.

Dr. R. S. Haynes, who has assisted me in a great many of these operations, has timed our visit from the time we entered the house until we left it, and found it oftentimes not more than twenty minutes. When the patient is removed from the table he is sufficiently out of the anesthesia to cry vigorously. He is given nothing but broths and gruels for the day. An enema at 5 P.M. is given. The following day he sits up in bed and plays. The next day he is up and about and the next day out of doors. Neither ice-cream nor milk is given the day of the operation. I have experienced no little trouble with children who were given milk or ice-cream within a few hours after the operation. It is very apt to result in indigestion and high temperature, which alarms the family, who are inclined to attribute it to infection or something else very alarming.

It is claimed by the opponents of this finger method that complications follow the operation and that there are end results which are distinctly harmful. I have had one case of post-operative adenitis which responded promptly to local cold. The child had a temperature of 102° F. to 104° F. for three days. I have also had one case in which adhesions were formed by the pillars growing together. I have had no excessive hemorrhage at the time and no postoperative hemorrhage. This, I believe, is due to the fact, as mentioned before, the tonsil tissue is not cut, and the vessels in the pedicle readily contract. The rôle played by the lactate of calcium is an uncertain one, but those who have used it, together with myself, believe that the hemorrhage is lessened thereby.

During the past eighteen months I have performed 137 enucleations by the above method. Rarely has it been necessary to use anything other than the finger. In three or four instances a pillar separator and blunt curved scissors have been necessary. The only instruments required have been the gag, the tonsillotome and an adenoid curet.

Adenoids.—The removal of the adenoids is very simple and

requires but a few seconds. I use a modified Gottstein curet, which is built at an angle of about 45° . This curet is very sharp. I have long since discarded the forceps as being unnecessary. Two or three sweeps of the curet and all the adenoid tissue, hard and soft, is removed.

Adhesions.—From six weeks to three months after the operation the nasopharyngeal vault is examined for adhesions. The adhesions are usually attached anteriorly to the posterior surface of the inferior turbinates and oftentimes extending in a fan-shaped form to the posterior and lateral wall. My attention was first attracted to the presence of these adhesions by mothers who brought their children for treatment and who would state, in getting their history, that the adenoids had been removed and the child was relieved for a few months when the obstruction became as marked as before. The operator was naturally blamed for not completely removing the adenoid tissue.

Examination of the vaults in these cases disclosed the adhesions. The adhesions are usually readily removed with the finger. I have seen 3 cases, however, in which this could not be done on account of the firmness of the adhesions. One was recently operated by a New York laryngologist for relief of the condition. Besides limiting the usual breathing space, these adhesions may be the cause of cough, which may be very teasing and troublesome.

A girl of nine years came to me because of a persistent cough, which had continued during the winter and which could not be relieved. She had been operated for adenoids four years before. I found fairly firm adhesions, which were reduced with the finger. The cough stopped at once. The mother then brought me 2 other children upon whom the operations had been unsatisfactory, both showing adhesions.

The existence of these adhesions is denied by many operators. I have found them after operations performed by men who said they did not know of them. Every man will find them in many of his cases if he will introduce his finger in the vault and search for them.

BENEFITS OF THE OPERATION OF REMOVAL OF THE TONSILS AND ADENOIDS.

The usual advantages claimed, those relating to mouth breathing, facial deformities, etc., are sufficiently well-known to be

omitted before this audience. I would call your attention, however, to certain benefits that are not perhaps generally appreciated.

In Delicate Children.—In my office work I have occasion to treat every year a large number of children who come because of defective growth, who are suffering from secondary anemia, or who are in some way delicate. I have found these children remarkably improved by the removal of diseased tonsils and adenoids which are very apt to be present.

Scarlet Fever.—I have been surprised to note the ease with which children ill with scarlet fever will pass through an attack when they had normally resistant throats.

Adenitis.—Adenitis, tuberculous and otherwise, is a very unusual occurrence in a child who has had his adenoids and tonsils properly removed.

Among the large number of cases operated upon I have yet to hear a regret expressed by the parents because the operation had been performed. I have myself had occasion repeatedly to regret that a complete enucleation had not been performed in my earlier cases.

Conclusions.—The finger enucleation method is best because of its rapidity. The child is kept under the anesthetic but a very short time.

Completeness.—The entire tonsil is removed with little or no cutting of the tonsil.

Absence of hemorrhage for reasons already given.

Few instruments required.

Short convalescence.

AORTIC REGURGITATION IN AN INFANT.—W. Ansley-Young (*Lancet*, 1910, Vol. II., p. 802) records a case in a boy, aged eighteen months, whose mother, aged twenty-eight years, had had two attacks of rheumatism, the first six years and the second two and a half years previously, without apparent effect on the heart. It is uncertain whether the child's lesion was due to endocarditis *in utero* or to a congenital malformation of the aortic valves. The only other child, a girl, aged five years, had a normal heart.—J. D. ROLLESTON.—*British Journal of Children's Diseases.*

INVOLUTION OF THE THYMUS BY THE X-RAY.*†

BY ALFRED FRIEDLANDER, M.D.,

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At the present time the problems of thymus physiology and pathology are being studied by numerous investigators from various viewpoints. The abnormal constitutional state, known as the status lymphaticus, is receiving much attention, especially with reference to its therapy.

As is well known, the chief characteristics of the status consist of an enlarged thymus, general enlargement of the lymph node groups in various parts of the body, hypertrophy of the tonsils and of the pharyngeal lymphoid tissues, and of the intestinal follicles, together with enlargement of the spleen. From the clinical standpoint, particularly with reference to the production of symptoms dangerous to life, the enlarged thymus is of first importance. There has been much discussion as to whether or not a greatly enlarged thymus can produce the symptoms of thymic asthma by mere mechanical compression. But, whether these symptoms are due to such direct pressure, or whether there is the indirect effect of the enlarged thymus pressing upon the great vessels and nerve trunks in the so-called critical space of Gravit, or whether finally there is a true toxemia resulting from excessive internal secretion (Svehla's hyperthymization), the fact remains that it is the enlarged thymus which gives rise to the threatening symptoms.

It is doubtless true that there are cases of enlarged thymus without the complete syndrome of status lymphaticus, because in not a few of the cases of thymic death neither spleen nor lymph glands have been found to be enlarged. Indeed, as a matter of fact, in typical cases of status lymphaticus, symptoms as such arise practically always as a direct result of thymus enlargement. So far as the production of thymus pressure symptoms is concerned, mechanical compression, hyperthymization, indirect compression of great vessels and nerves may all be etiologically important, but the point of greatest clinical concern is that

* Read before the Cincinnati Society for Medical Research, April, 1911.

† From the Laboratory of the Cincinnati Hospital. Director: Dr. Paul G. Woolley.

we have life-threatening symptoms produced directly as a result of the enlarged thymus.

This fact has been recognized from the viewpoint of therapy because practically all the therapeutic efforts heretofore have been directed to the relief of the direct pressure effects of the enlarged thymus. It has long been recognized that medicines had little or no power to relieve thymic asthma. Within recent years surgical intervention in these cases has therefore been sought. The earliest surgical procedure for the relief of the pressure effects of the enlarged thymus consisted of the so-called thymopexy, *i.e.*, suturing the thymus to the inner surface of the sternum. The results following this operation have not been satisfactory, and latterly it has been superseded by actual thymectomy—the removal of more or less of the gland itself. This operation has been successfully performed a number of times with complete relief of the pressure symptoms. But the mortality of the operation itself is high. Then, again, aside from the danger of the operation itself, it seems probable, in the light of later researches, that the removal of all, or even of a greater part, of the thymus may be fraught with grave danger to the subsequent development of the individual. The complete removal of the thymus during the period of its functional activity has been followed in the lower animals (rabbits, guinea pigs, dogs) by very marked changes in the central nervous and osseous systems, so that the animals have not developed normally at all. While the animals have survived the operation itself, death has subsequently occurred, in many instances, under circumstances leaving no room for doubt as to the rôle of the thymectomy in its production. While different observers have obtained slightly different results, the general picture after thymectomy has been about the same. Thus the findings of Basch,¹ Lucien and Parisot² and of Klose,³ to mention just a few names, are all approximately alike. The results of complete thymectomy as obtained by Klose (*loc. cit.*) in dogs are as follows: "For the first two or three months after the operation the animals are apparently well-nourished—even over-nourished (*stadium adipositas*). But after this period there is a marked loss of weight. Marked changes ensue; at first slowly, later with great rapidity. The general weakness and especially the weakness of the bones becomes very marked. The animals do not grow; become dwarfed. The appetite remains voracious. It is difficult to coax the dogs from their kennels. If they are forced

to move, they stagger about aimlessly; spontaneous bone fractures occur frequently. There is marked tremor. The animals become distinctly idiotic, attempting to eat stones, corks, parts of their own bodies. The hair falls out. Corneal ulcers resulting in blindness are common. The end picture of thymectomized animals is always that of coma thymicum, and this stage is reached in from six to fourteen months after the operation." There can be no question of the gravity of the operation of thymectomy, both as to immediate and secondary results, and this from both clinical and experimental observation.

In July, 1907, I reported a case of status lymphaticus with enlarged thymus successfully treated by the X-ray.⁴ I had been led to try the X-ray in this case because of the work of Heinecke⁵ on the effect of the X-ray on lymphoid tissue (to be referred to later). Since this time several similar cases have been reported, four from this city. In October, 1910, Rachford⁶ reported 2 more cases, one of which was seen by me also. The value of the X-ray in cases of status lymphaticus with enlarged thymus may now be considered as established. It is a noteworthy fact, that although only the region of the thymus is exposed to the X-ray, the effects of the treatment are manifest not only on the thymus, but on the spleen and lymph glands as well. With the idea of investigating this finding experimentally and with the further idea of elaborating the technique of the use of the ray in these cases, this experimental study of thymus involution was undertaken.

The radiologic part of the work was done by Dr. Sidney Lange, radiographer of the Cincinnati Hospital, and all actual details of the X-ray treatment, measurements of the tubes, currents, etc., were under his supervision.

Technique.—After some preliminary investigation, we decided to use rabbits in our work. In each series, rabbits of one litter were chosen, and in each series one rabbit was retained untreated as a control. By a very ingenious arrangement of Dr. Lange's, the animals were so placed in relation to the tubes that only the region of the thymus and the immediate surroundings were exposed to the action of the X-ray. Particular care was taken to see that the region of the spleen could not come within the focus of the X-ray.

The experiments were purposely varied. Thus in one series each animal (except the control) received only one exposure

of a measured current. The animals were then allowed to live varying lengths of time in order that possible differences in the gland might have time to develop. In another series, the animals received varying numbers of treatments, with two or three days interval between exposures. In the next series the time of the exposure was changed. In another series all animals were given excessive doses frequently repeated, the attempt being made to induce complete atrophy.

TABLE I.

Series I.—Rabbits of a litter seven weeks old. Each treatment time 15 minutes. Current 2 milliamp. Tube=Walter 5. Distance (anode to skin) 6 inches. Aluminum and leather filter.

Number or Designation of Animal.	Weight of Animal. Before Treatment.	After Treatment.	Weight of Thymus.	Remarks.
1. Control	?	750.0	0.55	
2. R. B.	760.0	840.0	0.32	— 9 treatments over 3½ weeks
3. R. E.	675.0	680.0	0.11	— 12 treatments over 4½ weeks
4. R. Ba.	740.0	790.0	0.00(?)	15 treatments over 5½ weeks
5. Control	?	755.0	0.44	

Series II.—Rabbits of a litter four weeks old. Each treatment time 20 minutes. Current 2 milliamp. Tube=Walter 4. Each animal except controls received twelve treatments over three weeks.

Number or Designation of Animal.	Weight of Animal. Before Treatment.	After Treatment.	Weight of Thymus.	Remarks.
1. Control	—	275.0	0.22	
2. Wh. B.	330.0	355.0	0.025	Killed at end of 3½ weeks
3. Wh. H.	275.0	340.0	0.02	Killed at end of 4½ weeks
4. R. E.	290.0	355.0	0.01	Killed at end of 5 weeks
5. Control	—	315.0	0.17	

TABLE II.

Series III.—Five rabbits of a litter four weeks old. Each animal, except the controls, received fifteen treatments on successive days, each treatment lasting fifteen minutes. Current 2 milliamp. Tube = Walter 4. Distance (anode to skin) 10 inches.

In this series, the thymus in each of the treated animals disappeared completely under the treatment. There was left merely a small mass of fat and connective tissue, without any glandular substance. The over-exposure had been purposely done in order to see whether this result could be obtained.

Series IV.—In this series each treated rabbit was given a single exposure only. The time of exposure in each case was 720 milliamper-seconds. Tube=Walter 4. Distance 10 inches. The animals were all treated on the same day and then killed after lengthening periods of time.

Number or Designation of Animal.	Weight before Treatment.	Weight at Autopsy.	Time of Autopsy after Treatment.	Weight of Thymus.	Weight of Spleen.
2. Br. W.	—	410.0	24 hours	0.27	0.5
3. R. B.	—	430.0	72 hours	0.3	0.33
4. R. B.	568.0	600.0	144 hours	0.2	0.35
5. R. E.	568.0	538.0	216 hours	0.11	0.38
6. Control	450.0	454.0	—	0.24	0.45

Animals of a litter five weeks old.

TABLE III.

Series V.—Animals of a litter four weeks old. In this series each treatment lasted ten minutes. Current 2 milliamp. Tube=Walter 4. Distance 8 inches. The treatments were given daily on successive days, but the number of treatments varied for the different animals. All of these animals were killed two weeks after the treatments.

Number or Designation of Animal.	Weight of Animal before Treatment.	At Autopsy.	Number of Treatments Given.	Weight of Thymus.	Weight of Spleen.
7. R. E.	315.0	305.0	3	0.05	0.19
8. L. E.	315.0	335.0	2	0.05	0.2
9. R. B.	310.0	332.0	4	? (Shred)	0.18
13. L. C.	315.0	335.0	4	0.06	0.25
14. Control	—	450.0	—	0.12	0.35

Two of the animals of this series, to which five and six treatments respectively had been given, were found dead in the cages one morning. For fear that postmortem changes might cloud the findings, these animals were excluded from the series.

In the last series, only a few exposures were given, but these were given on successive days.

Throughout the experiments, the animals were weighed before any treatments were given, and again at autopsy, in order that we could be sure that no changes in the thymus could be ascribed to malnutrition of the animal. Loss of weight of the animals was observed but twice in all our experiments, amounting in one case to 30 g. ($\frac{1}{10}$ of body weight) and in the other to 10 g. ($\frac{1}{31}$ of body weight).

Skin burns were never induced, except in the animals of Series III., which had purposely been over-treated.



PLATE I.

The current most generally used was 2 milliamp. The tube usually measured Walter=4. Distance (anode to skin) varied from 6 to 10 inches in the different series.

At the autopsy, the thymus in each case was carefully dissected out, weighed, then immediately immersed in Zenker's solution. In the later series the spleen and adrenal glands were likewise removed, the spleen in each case being weighed before immersion in the preserving fluid.

The details of the series can be seen in the accompanying tables, but the following special points may be noted. (Tables I., II. and III.)

Diminution of the weight of the thymus, both absolute and relative, to the body weight of the animals (as compared with the controls) was constant. This loss of weight was proportionate (a) to the number of exposures (Series I.); (b) to the length

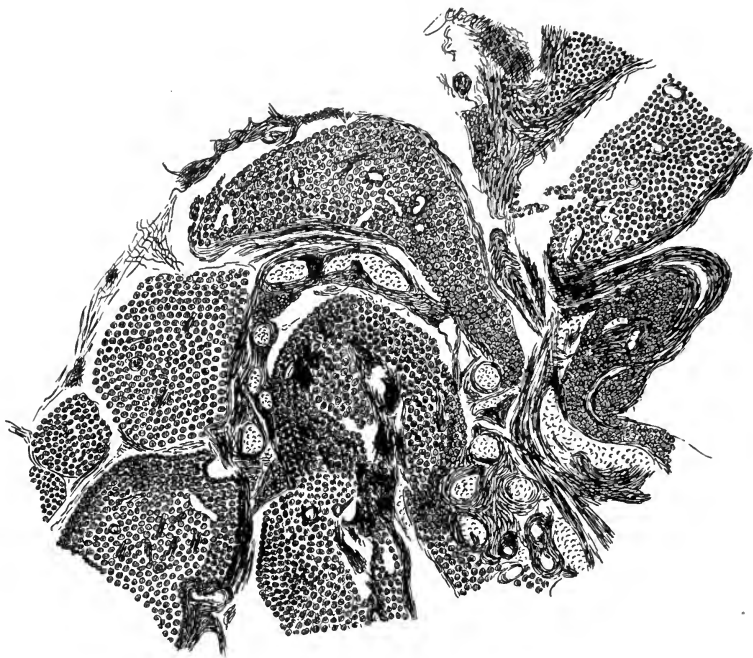


PLATE II.

of time which elapsed between the treatment and the autopsy (Series II.) (Series IV.). In Series IV., where each animal received only one treatment, the weight of the thymus decreased almost in direct proportion to the length of time intervening between exposure and autopsy.

In Series III., where each animal received fifteen treatments on successive days, each treatment lasting fifteen minutes, the thymus in each case disappeared completely under the treatment. There was left merely a small mass of fat and connective tissue without any glandular substance whatever.

In Series IV. and V. the spleen and adrenals were removed at autopsy. The adrenals were not weighed. The spleens were. In Series IV., where each animal received a single treatment only, the relation of spleen weight to body weight in the control animal was 1:900. In the animal killed twenty-four hours after ex-

posure this relation was as 1:820; animal killed after seventy-two hours 1:1300; animal killed after 144 hours 1:1800; animal killed after 216 hours 1:1600.

A similar loss of weight of the spleen, though not quite as marked, was found in the animals of Series V.

Microscopic technique and findings: The organs to be studied were fixed in Zenker's fluid, hardened in alcohols, and imbedded in paraffin. The stains ordinarily used were Van Gieson, Hematoxylin-eosin, Mallory's anilin blue and Borel's.

The thymus: To sum it up briefly, the effect of the X-ray upon the thymus is that it induces a replacement fibrosis.

By varying the number and the intensity of exposures given and the length of time the animal is permitted to live after treatment, it is possible to induce any degree of fibrosis from the very slightest up to a complete disappearance of all glandular tissue.

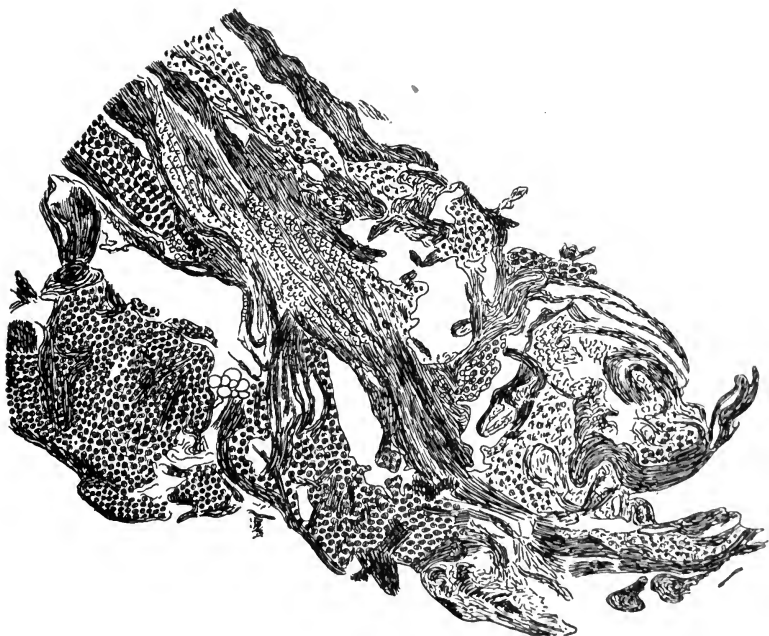


PLATE III.

Indeed, by giving the animals very intense exposures on successive days we found it possible to cause a complete disappearance of the gland, the animals being killed directly after the last treatment. There was found in these animals only a small amount of fat and fibrous tissue. (Series III.)

That the X-ray has an elective action on lymphoid tissue was pointed out in 1903 by Heinecke.⁵ He found that in young animals (rabbits, guinea-pigs and dogs) changes in the spleen occurred very promptly after exposure to the X-ray. There was a marked increase of pigment, disintegration of many cells and reduction in the size of the Malpighian bodies. In addition there was rarefaction of the cellular elements of the spleen pulp. An-



PLATE IV.

alogous changes to those seen in the spleen follicles occurred in all the lymphoid groups of the body, in the follicles of the intestine and in the thymus.

More recently, Aubertin and Bordet⁷ and Rudberg⁸ have studied the thymus involution after X-ray in detail. Rudberg indeed has found that changes in the thymus occur as early as three and one-half hours after exposure. "There is marked disintegration of the small thymus cells at this time, the nuclear fragments being taken up by the reticular epithelium or dissolved in the intercellular spaces in from twelve hours to two days.

According to the length and intensity of the exposure there may be a complete disappearance of the lymphoid elements, the gland taking on an epithelioid character."⁹

These early changes we have been able to follow distinctly. Furthermore, we have succeeded in inducing various grades of fibrosis up to the complete involution of the gland, by varying the number of exposures, the degree of intensity of current and the intervals between treatments, and the elapsed time after treatment to autopsy. This fact is of prime clinical and therapeutic importance.

Taking the control, untreated animals as normal, with a thymus of course unchanged, we have been able to induce gradually

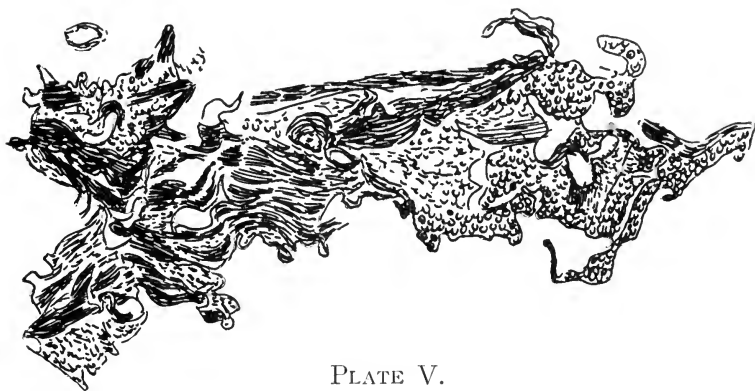


PLATE V.

increasing degrees of fibrosis up to the stage where the thymus is completely sclerotic. This series is illustrated by the accompanying set of drawings, made for me from the specimens by Dr. L. G. Tedesche. (Plates I. to VIII.) A short résumé of the histologic findings in this series of increasing degrees of fibrosis of the thymus follows:

(1) Animal 2 Br W. One exposure only of 720 M. A. Sec. Animal killed after twenty-four hours. (Series IV.) (See Plate I.)

The section shows that cortex and medulla are still distinct. There is a beginning disappearance of the small thymus cells, especially in the medulla, the cortex being still normal. There are distinct evidences of phagocytosis in some of the medullary reticular cells.

(2) Animal 3 R B. One exposure only, of 720 M. A. Sec. Animal killed seventy-two hours after exposure. (Series IV.) (See Plate II.)

The beginnings of the fibrosis are already to be seen. There are areas in which the reticular structure shows up much more prominently than in the normal gland, because of the destruction of the small thymus cells. In such areas, the cells of epithelioid



PLATE VI.

type predominate; indeed the tissue begins to assume an epithelial aspect.

(3) Animal 4 R. B. One exposure only, of 720 M. A. Sec. Animal killed 144 hours after exposure. (Series IV.) (See Plate III.)

There is a distinct increase in the amount of intercellular supporting tissue and the fibrils of connective tissue are more distinct. But in this thymus the evidences of regeneration are also distinct. Mitotic figures are common, especially in the nuclei of the reticular cells, and there are areas scattered throughout the gland showing definite evidence of regeneration. (The clinical significance of this regeneration of the thymus after exposure to the X-ray will be referred to later.)

(4) Animal 2 B. Nine exposures. Each fifteen minutes; given over a period of three and one-half weeks. (Series I.) (See Plate IV.)

Large areas of glandular substance are replaced by fibrous tissue, parts of which show enlarged spindle-shaped cells. In other portions the fibrous tissue is denser and the young connective tissue cells are no longer to be seen. The bands of fibrous tissue not only encircle the thymus lobules, but also run in between the lobules, separating them. Along some of the interlobular fibrous bands there are well-marked hemorrhages. There is some thickening of the adventitia of the vessels. The Hassall corpuscles are well preserved.

(5) Animal 4 R. E. Twelve exposures, each of twenty minutes, over three weeks. Killed after four and one-half weeks. (Series II.) (See Plate V.)



PLATE VII.

The whole gland is sclerotic to the extent that fully half the tissue is fibroid. There is marked perivascular fibrosis. The Hassall corpuscles, though present, are atrophic. There is a tendency for the thymus tissue remaining to be arranged in groups or nests.

(6) Animal 9 R B. Four exposures only, but given on successive days. Each of ten minutes. Killed two weeks after last exposure. (Series V.) (See Plate VI.)

It is noteworthy that very intense fibrosis occurred here, after only four exposures. But these were given on successive days. The Hassall corpuscles show a marked degeneration (keratohyalinization). The thymus cells remaining, in many instances show fragmentation. The fibrosis here is much more marked than in the case of the animal just preceding, though this rabbit received twelve exposures. But these were given over a period of three weeks, while the four exposures in the case of Animal 9 R B. were given on successive days.



PLATE VIII.

(7) Animal 4 R Ba. Fifteen exposures. Each of fifteen minutes, over five and one-half weeks. (Series I.) (See Plate VII.)

The fibrosis is very marked and the tendency to grouping of the remaining thymus cells is very distinct. Rudberg has noticed a similar change in the thymus of animals receiving prolonged exposure.

(8) Animal 3 Wh H. Twelve exposures. Twenty minutes each. Over three weeks, killed at end of five weeks. (Series II.) (See Plate VIII.)

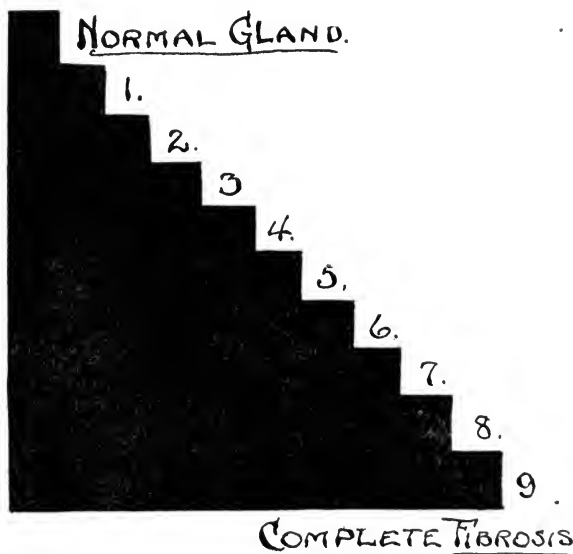
A further degree of fibrosis is represented here. While this animal received only twelve exposures, as contrasted with fifteen in the case of the preceding animal, the intervals between the exposures were shorter.

(9) Animal 13 L C. Four exposures on successive days. Each of ten minutes. Killed two weeks after last exposure. (Series V.) (See Plate X.)

This thymus showed complete fibrous involution. The gland was converted into thick bands of fibrous tissue without any remaining evidences of reticular structure. This animal received only four exposures, each of ten minutes duration. But they were given on successive days.

TABLE IV.

Schema illustrating increase of fibrous tissue approaching complete fibrosis, as illustrated in cases below:—



- 0.—Normal animals. Not treated. Controls.
- 1.—2 Br. W. One exposure, 720 M. A. Sec. Killed twenty-four hours after treatment. (Series IV.)
- 2.—3 R. B. One exposure, 720 M. A. Sec. Killed seventy-two hours after treatment. (Series IV.)
- 3.—4 R. B. One exposure, 720 M. A. Sec. Killed 144 hours after treatment. (Series IV.)
- 4.—2 B. Nine exposures, each of fifteen minutes, over three and one-half weeks. (Series I.)
- 5.—4 R. E. Twelve exposures, each of twenty minutes, over three weeks. Killed at end of four and one-half weeks. (Series II.)
- 2 Wh. E. Twelve exposures, each of twenty minutes, over three weeks. Killed at end of three and one-half weeks. (Series II.)
- 6.—9 R. Ba. Four exposures on successive days, each of ten minutes. Killed two weeks after last exposure. (Series V.)
- 7.—4 R. Ba. Fifteen exposures, each fifteen minutes, over five and one-half weeks. (Series I.)
- 8.—3 Wh. H. Twelve exposures, each of twenty minutes, over three weeks. Killed at end of five weeks. (Series II.)
- 9.—13 L. C. Four exposures on successive days, each of ten minutes. Killed two weeks after last exposure. (Series V.)

From the clinical standpoint of treatment of cases of status lymphaticus with enlarged thymus by the X-ray, it must of course be important to determine how the treatment should be given with reference to the number of treatments, duration of each treatment and order of succession. Partly with this end in view, the experiments were varied in the different series of animals. Taking the degree of fibrosis as a guide, the following table has been prepared, showing the gradations of change from the normal control organ to the practically completely fibrotic one. (Table IV.)

A study of the table shows the following facts:

The glands showing the least change were those to which only one exposure was given. Of the three in this group, the increase in fibrosis was (as was of course to be expected) in direct proportion to the length of time elapsing from the exposure to the autopsy. Thus the animal killed twenty-four hours after exposure showed less fibrosis than the one killed after seventy-two hours, and this one in turn less than the one killed after 144 hours. It is to be noted that the current used in these single exposure cases was stronger than in the other experiments. The next thymus in the scale of fibrosis was that of an animal receiving nine exposures of fifteen minutes each over three and one-half weeks. The changes here were a little less pronounced than in the cases of the next two animals, each receiving twelve exposures of twenty minutes each, over three weeks, these animals being killed at the end of three and one-half and four and one-half weeks respectively.

A greater degree of fibrosis was induced in an animal receiving only four exposures, each of only ten minutes. But it is significant that these treatments were given on successive days, the animal being killed two weeks after the last treatment.

The next degree of fibrosis was induced by fifteen exposures of fifteen minutes each, over five and one-half weeks, and the following one by twelve exposures of twenty minutes each, over three weeks. The last degree of fibrosis, complete involution, was induced by four exposures on successive days, the animal being killed two weeks after the last treatment. This animal received exactly the same number of treatments as did Animal 4 R Ba. of the same series, in which the degree of fibrosis induced was also very high.

While it would of course be decidedly unsafe to make absolutely sweeping deductions from such a table as this, certain sig-

nificant facts may at least be noted as being of therapeutic value.

Intense fibrosis may be induced by a comparatively small number of exposures if they are given on successive days.

When therefore the symptoms of pressure from the enlarged thymus are very urgent, and when there is evidently very marked mechanical obstruction from the enlarged thymus, the X-ray treatments should be pushed, being given on successive days to get quick results. The shorter the interval between the treatments, the more marked the results obtained. Four exposures on successive days (Animal 13 L C) gave a greater degree of fibrosis than fifteen exposures over five and one-half weeks. (Animal 4 R Ba.)

It is probable that the age of the animal would have something to do with the ease of production of fibrosis under treatment. The animals receiving only four treatments (on successive days) with high degrees of fibrosis, were rabbits four weeks old. In cases of thymic asthma, therefore, occurring in infants, the earlier treatment is begun the better the outlook.

Where the symptoms are not so urgent, where therefore there is not the necessity for producing either so great a degree, or so rapid an induction of fibrosis, the treatment may be given at longer intervals.

Clinically it has been noted that the symptoms of thymic asthma, which gradually disappear under X-ray treatment, tend to recur after varying periods of time in some cases. This is doubtless to be explained on the basis of partial regeneration of the thymus after partial fibrosis has been induced. We are able to explain this and to demonstrate it in our experimental series; because we have been able to show definite evidences of regeneration of thymus tissue in partially fibrotic glands. Where such symptoms of thymic asthma recur therefore, it means that the artificial involution of the gland has not been carried far enough, indicating that a further course of X-ray treatment is needed.

For instance, in the first case reported by Rachford (already alluded to), it is noted that after the first and immediate improvement under the X-ray, the child had "at intervals of about three months three very slight attacks characterized by cough and dyspnea which occurred without apparent cause and which were promptly relieved by one or more mild X-ray treatments."

As is well known, enlargement of the spleen and lymph node groups of the body constitute constant phenomena in true cases

of status lymphaticus. In the original case of status (reported by me in 1907), which was treated by the X-ray, it was noted that though only the region of the thymus was exposed to the action of the X-ray there was a marked decrease in size of the lymph glands and of the spleen coincidentally with the shrinkage



PLATE IX.

of the thymus. The same condition was observed in the case under the supervision of Rachford and myself and subsequently reported by Rachford.⁶

In order to explain if possible, or at least to confirm this finding, experimentally, the spleens of the rabbits were examined

systematically in our later series. Attention has already been called to the fact that the region of the spleen was absolutely protected from the direct action of the rays in all our cases.

A marked reduction in the size of the spleen in relation to the body weight of the animal was observed in our treated animals, as will be seen by reference to Tables II, and III. But in addition to this there was a very marked change in the histologic picture of the spleen of the treated animals.

In his original studies on the effects of the X-ray on lymphoid structures, Heinecke⁵ found that in young animals, changes in the spleen occurred very promptly. There was a marked in-



PLATE X.

crease of pigment, disintegration of many cells, and reduction in the size of the Malpighian corpuscles. In addition there was a rarefaction of the cellular elements of the spleen pulp. Now these are precisely the changes which occurred in the spleens of our treated animals. The reduction in number, size and clearness of outline of the Malpighian corpuscles is very striking, and in our series was found to be correlated in degree to the amount of fibrosis in the corresponding thymus. The disintegration of the spleen cells (as studied under high magnification) was marked. The general picture of the change in the spleen picture is well illustrated in Plates IX. and X. Plate IX. shows the

spleen of an untreated (control) rabbit. Plate X. shows the spleen of Rabbit 13 L. C. (Series V.), in which complete fibrosis of the thymus was induced. (Plate VIII.) The reduction in number, size and clearness of outline of the Malpighian corpuscles is very pronounced. That some relation exists, functionally speaking, between thymus and spleen now seems assured. Indeed, in some of the later researches on thymus physiology the spleen is definitely referred to as the "organ of substitution" for the thymus after the period of functional activity of the latter. Without attempting any discussion of this question, it may be noted as significant that both clinically and experimentally, change in size (and in our experimental series in histologic picture) of the spleen occurs *pari passu* with the artificial involution of the thymus. And this though in both instances the region of the spleen is absolutely protected from any direct action of the X-ray. In our later series the adrenals of the rabbits were carefully examined, but no histologic change was found in the adrenals of any of the treated animals.

The experiments certainly seem to justify the belief that in the X-ray we have a therapeutic agent of great value in the treatment of enlarged thymus. The fact that in our clinical cases of status lymphaticus concomitant changes occur in other portions of the lymphoid tissues of the body, that experimentally we were able to induce changes in the spleen, both go to prove that the X-ray is a valuable agent in the treatment of status lymphaticus itself. For if by exposing only the region of the thymus to the action of the Roentgen ray, we can cause diminution in size of the spleen and of the lymph nodes, can change a lymphocytic to a normal blood picture, it would seem that we have made some distinct advance in the treatment of status lymphaticus. Certainly the X-ray is far safer than the dangerous operation of thymectomy. Apparently it is not followed by subsequent ill effects, either. Thus it is interesting to note that at this writing, the first patient treated by the X-ray (over six years ago) is in excellent condition. He shows absolutely no evidence of anything like a lymphatic constitution. His development has been perfectly normal, his general health excellent. The other cases are all in excellent condition also.

SUMMARY.

(1) Internal treatment is of no avail in cases of enlarged thymus or of status lymphaticus.

(2) Surgical intervention, *i.e.*, thymectomy, has been successful in a number of cases. But (a) the operation is an exceedingly dangerous one. (b) Complete thymectomy in lower animals is invariably followed by subsequent developmental changes, manifested in the central nervous and osseous systems chiefly, and invariably leading to the death of the animal.

(3) In the X-ray we have an agent which is at the same time safe and efficacious in the treatment of enlarged thymus and status lymphaticus.

(4) By means of the X-ray it is possible to induce not only an involution of the thymus, but also in cases of status lymphaticus to reduce the size of the spleen, of the lymph nodes and to change the lymphocytic blood picture to the normal one.

(5) By variation in the number and frequency of X-ray exposures, it is possible to bring about the involution with varying degrees of rapidity. Where the symptoms of thymic asthma are urgent, the exposures can be given on successive days, thus inducing prompt results.

(6) Experimentally, it has been shown to be possible to induce any degree of fibrosis of the thymus from the very slightest to absolutely complete sclerosis.

(7) Clinically the dosage of X-ray can therefore be regulated according to the necessities of the case.

(8) A thymus partially involuted by the X-ray is capable of regeneration. The danger of loss of thymus function (as in the case of complete thymectomy) is thus obviated and the metabolic changes after thymectomy averted.

(9) The use of the X-ray in these cases is without danger to the individuals, as proved by the subsequent normal development of our treated cases.

It is a pleasure to acknowledge a debt of gratitude to Dr. P. G. Woolley, for his interest in and critical supervision of the experimental work.

4 West Seventh Street.

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OPEN-AIR SCHOOLS AND FRESH AIR IN SCHOOLS.*

BY LOUIS C. AGER, M.D.,
Brooklyn.

The open-air school has come to stay. It has been discovered by the popular magazine writers and by the Sunday newspaper. It is too good a thing to be destroyed by foolishness and lack of common sense; nevertheless, like many a politician, it needs to be protected from its friends. Because 20 badly-nourished children in Montclair are given three nutritious meals a day, are properly washed and their teeth attended to, and have an enforced rest hour in steamer chairs after the mid-day meal, and all in the open country air, it hardly seems logical to draw the conclusion that the open air is entirely responsible for the wonderful improvement in the children. If every school child in Brooklyn was compelled to take a bath and brush its teeth when it reached school, and was given one proper meal with an hour's rest in the middle of the day, can anyone doubt what the result would be? The members of the medical profession will neglect a very important civic duty if they do not take an active interest in the sane application of this new phase of the fresh air idea.

Only a few minutes need be given to the history of open-air schools, as anybody interested in the details will find the little book entitled "Open-air Schools," by L. P. Ayres, of the Russell Sage Foundation, Doubleday, Page & Co., interesting reading. The first school, opened at Charlottenburg, Germany, in 1904, was started as an adjunct to the open-air treatment of tuberculosis, in order that the children might be able to continue their school work. This has also been true of the first schools established in England and in America. In all such schools feeding has been an important part of the curriculum. In Germany five meals a day have been supplied; in England and America two or three. There is, of course, no difference of opinion as to the importance of this phase of antituberculosis work. Our only duty is to encourage its extension whenever possible.

The next step in the development of open-air schools both here and in Europe was the application of the idea to children suffering from anemia and other forms of malnutrition. In such cases, also

* Read at the Pediatric Section, Kings County Medical Society, May 24, 1911.

—in Montclair for instance—proper feeding has been included as an important part of the treatment. This very interesting and practical question of feeding children in the schools must sooner or later be fully discussed and solved by the medical profession, but it is too large a topic to be included in this paper.

We are just beginning to enter upon the third stage of the open-air school, that is, its application to well children and to schools as a whole. It is a perfectly obvious fact that well children would retain their health better and be less likely to contract infections if at least a part of their school hours were spent out of doors. It throws an interesting light upon the workings of the human mind that the practical application of this fact had to come through the treatment of the sick. It is another instance of preventive medicine being the last step in the application of medical knowledge.

Although we have an abundance of evidence from many sources and from our personal experiences that open air and fresh air have wonderfully beneficial effects in all sorts of acute and chronic diseases, and although it has been recognized since prehistoric times that an outdoor life is the most hygienic life, nevertheless we have no accurate knowledge as to why this is so. It is only in very recent years that it has been shown that the displacement of the oxygen in the air by carbonic acid gas does not produce the so-called vitiated air which was held responsible for various diseased conditions. We now know that there is an ample supply of oxygen in the air of a confined space long after the human lungs absolutely refuse to receive it. We know, further, that there is no piling up of the heavy carbon dioxide upon the floor until it becomes deep enough to drown us. Although it seems reasonable to conclude that there are some highly poisonous exhalations from the human body which gradually render indoor air unwholesome, no one has succeeded in demonstrating them. To correct this theoretical air vitiation various costly ventilating systems have been devised and have been installed in schools and hotels. In spite of such theoretical perfection of ventilation we all know that the feeling of relief and exhilaration which is experienced in going into the open air from such buildings is about as noticeable as in going from the average private dwelling.

This stimulation from "getting out doors" may be partly psychical, but the fact that there is apparently fully as great a

reaction in infants as in adults militates against such a theory. So far as I know the only methodical studies of this problem that have yet been made are those at the Presbyterian Hospital in connection with the out-door treatment of pneumonia. These studies are not yet published in full, but they show that in the cases studied the only discoverable change on removal to the roof was a rapid rise in blood pressure to normal or a little over—the same effect as was produced by an average dose of alcohol or digitalis. But the rise produced by fresh air was permanent, whereas the rise produced by stimulants is temporary, and is followed by a fall to a lower level than the previous one. It was further noted that the effect upon the blood pressure was just as great on the days when the weather was warm and balmy as on days when there was a marked difference between the ward and out-door temperatures. This indicates that there is something more than the cold bath effect of sudden change in temperature. Although there is little or no rise in the blood pressure of individuals whose pressure is already normal, it seems reasonable to conclude that there is some corresponding change in the arteriole circulation which has a rapid beneficial effect upon metabolism.

The original open-air schools were established for the purpose of giving sick children as much school instruction as was possible without interfering with the routine of treatment that they were receiving at the same time. In the next class of schools, also—those for anemic and debilitated children—the health received the first consideration and the school curriculum was drawn up with this in mind. In the final application of the fresh-air idea to the school life of normal children, the process must be to a considerable extent reversed. The carrying out of the full school schedule must receive the first consideration, and if any part of the work cannot be done in the open air some other place must be provided for it. This greatly complicates the establishment of strictly out-door schools for normal children, but very excellent results can be obtained in schools as at present constructed. This point will be discussed later.

In finding satisfactory locations for open-air schools many points have to be considered. Even in the suburbs of a large city suitable sites are not as numerous as might be supposed, and in the congested sections, where the need is greatest, the problem is still more difficult. The two essential characteristics of suitable locations are accessibility and protection. Accessibility for kinder-

garten children means a good deal more than it seems to at first thought. In the country and in the suburbs a sheltered spot upon the ground is the natural choice. It must be suitable for all kinds of weather except extreme heat, but in this climate wind, rain and mud are the most difficult obstacles to be overcome in rendering the spot accessible for small children. One hundred feet of mud or one open block of exposure to wind and rain will play havoc with the attendance register during many weeks of the school term in this climate. If the spot chosen is protected on the north and west by a steep slope of the land it will be difficult to meet the drainage problem during wet weather.

In the more thickly populated sections two courses are open—open-air schools may be located in the parks as has already been done in some cities, or they may be placed upon the roofs. The use of parks for this purpose is entirely justifiable for experimental purposes upon a small scale, but they could not be so used in any extensive way without spoiling them for their proper purposes. As the open-air idea grows in popularity there will be a greater and greater tendency to utilize the roofs of all new buildings, private houses, apartment houses, and others—and more roofs will be available for school purposes than there are at present. There is no practical reason why a whole block of buildings should not be erected in uniformity for office or store purposes, and the full sweep of roof be constructed for school or recreation uses. Every warehouse on our water front could be so used with tremendous benefit and economy. In considering roof schools the most important question in regard to accessibility is the supply of elevators and fire-escapes.

Under the heading of protection there are seven things to be considered—storms, wind, dust, smoke, sun, heat and cold. When the space is unlimited it has been the practice in the recovery schools to have all the time spent in the open except during storms, when the children are gathered into shacks or shelter tents. The delay and confusion of such changes are of minor consequence in recovery schools, but they would seriously interfere with the routine of regular school work. Some form of permanent overhead shelter is therefore necessary. Protection from the wind must be provided on account of driving storms, cold and the necessary use of books and papers in school work. In this climate this means side walls on the north, east and west. For the sake of the morning sun the east wall should be removable if possible,

and on account of the heat of the early and late school months there should be an opportunity for free ventilation on the north and west and there should be a drop curtain on the south. Aside from the heat it must be remembered that the direct rays of the sun are, in proportion to their intensity, actively destructive of all cell life. Direct sunlight is an excellent germicide, but it does not differentiate between pathogenic bacteria and human body cells. Nature has taken care of this to a certain extent by the supply of skin pigment, but there is no special advantage to the individual in extra exposure and the stimulation of further pigmentation. In all forms of anemia, and particularly in those secondary to chronic disease like tuberculosis, there is a subnormal supply of body pigments, and as a consequence direct sunlight has a deadly effect.

For protection from cold clothing is usually sufficient in an inclosed structure, and children soon become accustomed to using bare hands for long enough periods for the use of pen and pencil. During the rare periods of extreme cold in this climate, a hot-water bottle may be placed in the bottom of the sitting-out bag of those children who feel the cold. As a matter of fact, the properly-clothed child so rapidly accommodates himself to the cold that little trouble is experienced after the first few days. In dressing children for the out-door school we need to go back to the heavier woollen underclothes which our modern overheated schools and dwellings have rendered unnecessary and harmful. Outside woollen clothes, a heavy overcoat, warm gloves, toboggan cap are all required, and, finally, the sitting-out bag such as I show you here is absolutely essential. For explicit directions for making these bags I refer you to Dr. Ayres's book mentioned at the beginning of this paper.

In a large city dust or smoke may seriously interfere with the success of an open-air school. Although we have no proof that the dust of city streets actually carries the germs of the infectious diseases, there is ample clinical evidence that the various catarrhal diseases of the respiratory tract are the result of dust inhalation. For this reason the roof school and the roof playground are much superior to those located on the street level. On the other hand, there are many roofs which could not be occupied on account of the smoke and gas from adjacent chimneys. This objection might easily be overlooked, as it will usually depend upon the direction of the wind. In some instances it can be readily overcome by the reconstruction of chimneys,

There are at present three open-air, or, to speak more accurately, fresh-air schools in Brooklyn, under the supervision of the Department of Education. The first was established on the old ferryboat *Susquehanna* in connection with the Day Camp of the Brooklyn Committee on the Prevention of Tuberculosis. The class is held in one of the cabins and the amount of fresh air is decidedly less than might be obtained by taking all the window sashes out of any modern schoolroom.

The first strictly open-air school in Brooklyn was opened last fall, as a branch of P. S. No. 93, for the children at the Home for Consumptives at Kingston Avenue and St. John's Place. It is conducted in a large summer-house, enclosed to a height of four feet with boarding. Above this on all four sides are window sashes, which may be closed on the windy or stormy side.

The first fresh-air classes in a public school building in Brooklyn were opened this April in P. S. No. 162, at Willoughby and St. Nicholas Avenues. This step was largely due to the efforts of Dr. Brundage, working through the Broadway Board of Trade. The classes are at present held in two regular class-rooms, with a southern exposure. The windows open upon the roof of the assembly hall, where the school is to be held as soon as the flooring can be laid and the awnings put up. These classes are for children with the various forms of malnutrition, particularly those with a tuberculous family history. The scholars at present receive milk or cocoa three times during the school day. A kitchen is being fitted out in order that a more generous diet may be provided.

The first private open-air school in Brooklyn is now being planned upon the roof of the Friends' School in Schermerhorn Street, largely through the efforts of Miss Woodward, the kindergarten teacher. The location is exceptionally fitted for the work. It is protected on the north by a six-foot brick coping, and on the west by a higher building. The southern side is entirely unobstructed, and the east nearly so. A wooden floor is to be laid and a slanting roof and side flaps of canvas on iron supports is to be erected over enough space for three class-rooms. The divisions are to be made by easily removable canvas drops. The remainder of the roof will be left exposed for the kindergarten games and exercises. In extremely severe weather the classes will occupy their regular rooms below. This is a distinct step in advance both because it is a private school and because it is an

application of the commonsense fresh-air idea to normal children. Of course no tuberculous children will be accepted, but this school will furnish an exceptional opportunity for those children suffering from anemia and malnutrition, whose parents prefer the advantages of a private school. At this school the youngest children have milk and crackers in the middle of the morning and a full hot meal may be purchased at noon.

In closing allow me to suggest a duty and a warning. As soon as a movement of this kind is well under way there are plenty of people lacking in common sense to take it up as a fad. The danger in this instance will be the demand of such people that the city shall throw away large sums of money upon the construction of special open-air schools with all sorts of frills. The tuberculosis sanatorium on Staten Island is a striking example of such a waste of public funds. Let us encourage in every way possible the use of available roofs for the work and for the play of our cooped-up city children, and in the construction of all kinds of buildings in the future let us bring our influence to bear for such a utilization of roof space. On the other hand, let us point out at every opportunity the self-evident fact, that as soon as the public is educated up to a recognition of the extreme value of fresh air in schoolrooms it will only be necessary to open the windows, or better still, to take out the window sash to let in all outdoors.

137 Clinton Street.

ETIOLOGY OF TETANY.—Quest (*Monats. f. Kinderhk.*, April, 1910) maintains that a lack of lime is the chief factor in the etiology of tetany, and that this may be the result of various causes. It is, however, principally due to an unsuitable diet, an excess or imperfect assimilation of the fat in milk causing the fat to combine with the lime, which is thus eliminated, independently of the amount ingested. An exclusive carbohydrate diet, on the other hand, may fail to supply an adequate proportion in the food. The beneficial effect of phosphorus and cod-liver oil is due to its favoring the retention of lime-salts rather than to any anti-spasmodic action. The injection of lime-salts may possibly be useful in cases showing a chronic tendency to tetany.—T. R. WHIPHAM.—*British Journal of Children's Diseases.*

COLON IRRIGATION. THE SHORT VS. THE LONG TUBE. A COMPARISON BASED ON 200 IRRIGATIONS.*

BY HENRY T. MACHELL, M.D. (TOR.),

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For several years I have felt that in giving colon irrigations to children, the use of the small, short rectal nozzle is preferable to the rubber catheter or the flexible rectal tube. The short nozzle has seemed more agreeable to the patient and certainly is simpler for the physician, the mother or the nurse.

In a number of instances I have seen the tip of the catheter reappear at the anus when I had flattered myself it must be 10 or 12 inches up the colon. I have seen this occur to trained nurses, and to other physicians, as well as myself. Therefore, I conclude, it could not have always been my technique which was at fault. Even if the usual directions as to (1) having the patient on the side; (2) having a volume of water of proper temperature ahead of the tip of the catheter; (3) gradual introduction; (4) the bag hung at proper height, etc., is observed, the nurse is fortunate, indeed, if she is not at times startled at the reappearance of the tip at the anus, or annoyed at the water not running out of the bag due to kinking of the catheter in the rectum.

Another objection to the catheter is that it must necessarily be introduced by a number of pushes or shoves, each of which irritates (it may be ever so slightly) the inferior hemorrhoidal nerves, and therefore gives some discomfort or sensation. Hence the longer and larger the tube the greater the number of pushes and consequently the greater number of uncomfortable sensations. A similar discomfort occurs during its withdrawal, though of course to a less degree.

When one bears in mind the fact that colon irrigation is commonly practiced for inflammatory conditions of the rectum and colon, the objection is worth bearing in mind. Another objection to the catheter, if it happen to be a stiff one, or if a heavy hand be guiding it, is a possible traumatism to the mucous membrane. Such a case I saw about a year ago.

* Read at the Twenty-third Annual Meeting of the American Pediatric Society, Lake Mohonk, June 1, 1911.

The small nozzle, on the other hand, goes in almost of its own weight by one or two slight pushes—a minimum of anal sensation and irritation being produced. Another advantage is that it can be used by the mother, a neighbor, or an untrained nurse.

I have for a long time thought that the fewer the anal irritations the larger is the amount of fluid which can be injected and the greater the length of time it will be retained. But this theory is so much at variance with the practice advocated by recent English, German and American text-books, that I have hesitated to do little more than put my theory into practice as occasion offered.

With the view of trying to compare the short and long tube, I enlisted the aid of Dr. George Boyer, House Physician at the Hospital for Sick Children, Toronto, and Miss Bain and Miss Hill, senior nurses in charge of the baby wards. They were asked to see that the short and long tubes were used alternately, and that an accurate record be kept.

I have now the records of 200 consecutive irrigations done during the winter of 1909, an analysis of which I propose to give you.

The records were kept under the following headings:—

Name and Date	Age in Months	Weight in Pounds	Disease, Acute or Chronic	Condition of Child - Weak, Fair Strong	Indication Blood Mucus Elimination	Last Stool Hours Ago	Amount Injected Before Return	Time Retained in Minutes	Nozzle Long or Short	Amount Finally Retained
1	2	3	4	5	6	7	8	9	10	11

2. The ages averaged nine and one-half months, the youngest being three months, the oldest sixteen months.

3. The weight averaged 9 pounds, 6 ounces, the lightest being 6 pounds, 10 ounces, the heaviest 17 pounds, 4 ounces.

4. There were 159 injections for acute diseases—mostly ileocolitis cases.

There were forty-one injections for chronic diseases—mostly marasmus.

5. The condition was described as strong in 12 cases; weak in 55 cases and fair in 153 cases.

6. The indication was blood and mucus in 164 cases; elimination in 34 cases and not stated in 2 cases.

The time elapsed since the passage of last stool varied from fifteen minutes to twenty-four hours and seemed to have no bearing on either the amount injected before return or on "length of time retained."

Average time retained:—

LONG.	SHORT.
31 returned at once.	31 at once.
22 retained up to 2 minutes.	28 up to 2 minutes.
15 retained 2 to 4 minutes.	18 2 to 4 minutes.

Thus the short tube has the advantage.

AVERAGE AMOUNT INJECTED BEFORE RETURN.

AGE.		WRIGHT.	
Ac. Cases	Under 9½ mos. {	Ac. Cases	Under 9 lb. 6 oz. {
	{ L. 9.12 oz. { S. 9.59		{ L. 9.52 oz. { S. 11.37
Ch. Cases	Over 9½ mos. {	Ch. Cases	Over 9 lb 6 oz. {
	{ L. 15.00 { S. 15.34		{ L. 9.98 oz. { S. 13.18
Ch. Cases	Under 9½ mos. {	Ch. Cases	Under 9 lb. 6 oz. {
	{ L. 13 oz. { S. 15.71		{ L. 12.71 oz. { S. 14.50
Ch. Cases	Over 9½ mos. {	Ch. Cases	Over 9 lb. 6 oz. {
	{ L. 15.61 oz. { S. 16.35		{ L. 14.70 oz. { S. 16.27

Amount Permanently Retained. In only twenty-four injections was any permanently retained. In twenty-one of the twenty-four times it was given for the purpose of elimination. In these twenty-one the buttocks were pressed together for a few moments to insure retention. The amount retained varied from 2 to 6 ounces—with the L. catheter 4.7 ounces, and with the short nozzle 4.1 ounces.

As fluid was retained only three times, where pressure on the nates was not made, comparison is valueless.

I have not seen colon irrigation discussed on these lines heretofore, and I recognize some of the defects. I feel, however, that I have shown as far as 200 irrigations can be made to illustrate it:

1. That for the "amount injected" the short nozzle had the advantage, whether the cases were acute or chronic or whether the age or the weight was considered.
2. That it was retained for a longer time where the short nozzle was used.
3. That the "amount permanently retained" was larger where

the short nozzle was used is not proven—no deductions can be drawn from so few injections.

That the fluid can be made to go up as far as the cecum with the short nozzle, one can readily prove by the use of the stethoscope as it is flowing up the bowel, but that the long tube ever gets even past the sigmoid is not so easily proven. That, however, is another question and is not within the scope of this paper.

If the short nozzle can be used with less discomfort and more ease, and, judging by the above figures, with better results, why use the more troublesome tube?

In practice I have not done so for fifteen years at least.

STERILIZED CLOTHING FOR INFANTS.—Edmond Weill (*Arch. de Méd. des Enf.*, April, 1910) advocates the use of sterilized clothing and dressings to prevent infections of the skin of infants in the hospitals. In the crèche at the University Hospital at Lyons, it was found that skin infections were common in children brought there for other diseases, and that no matter what measures were adopted they did not cease to appear until the ward adopted the use of clothing that had been sterilized after being washed in the usual way. These skin suppurations then decreased very much in number. Upon an occasion when the sterilizer was undergoing repairs it was found that the suppurations recurred, as they did when the head nurse went on her vacation and left the ward in the hands of a novice. Tests of the unsterilized clothing made by cultures showed that clothing rendered sterile by the irons soon became contaminated with a rich bacterial flora. The plan was adopted of placing the clothing to be needed for each child in a sterile canvas bag, which was then put in the sterilizer. It was not opened until needed for use, and then was found to be sterile. This stopped the appearance of the small pustules and erythema of the buttocks so often seen in children who suffer from diarrhea. It was found that these lesions were not only prevented, but were cured when they had occurred, by the sterilized clothing. The skin of an infant should be considered similar to a surgical wound and should be treated in the same manner, with aseptic dressings.—*American Journal of Obstetrics.*

FURTHER OBSERVATIONS ON THE SOY BEAN.*

BY JOHN RUHRÄH, M.D.,
Baltimore.

In 1909, at the meeting at Lenox, I called the attention of the Society to the soy bean, and suggested its use in infant feeding. ("The Soy Bean in Infant Feeding. Preliminary Report," ARCHIVES OF PEDIATRICS, July, 1909). Since that time I have had considerable experience with the use of the bean and also the flour made from it, and believe that it is a food of very considerable value in certain well-defined conditions, and I also believe that the bean will eventually be used as an article of diet in this country.

The composition of the soy bean I may remind you is as follows:—

Water	10.13 per cent.
Protein	34.63 " "
Fat	17.98 " "
Nitrogen free extract	30.50 " "
Fiber	3.69 " "
Ash	3.07 " "

Calculated to a water free basis:—

Protein	38.50 per cent.
Fat	20. " "

and the analysis of the soy flour made by the Cereo Company, Tappan, New York, shows the following:—

Protein (N. X. 6.25)	44.64 per cent.
Fat	19.43 " "
Mineral matter	4.20 " "
Moisture	5.26 " "
Crude fiber	2.35 " "
Cane sugar	9.34 " "
Non-nitrogenous extract	14.78 " "
Starch	none
Reducing sugars	none

* Read before the Twenty-third Annual Meeting of the American Pediatric Society, Lake Mohonk, June 1, 1911.

Polarization normal weight due to
 optically active substance other
 than cane sugar (included in
 proteids and non-nitrogenous
 extract) 7.86°

The percentage of protein in this flour is almost one-third greater than the percentage of protein in the whole beans. This is caused by removing the coarse, fibrous hulls which contain little protein.

Each ounce of this soy flour yields about 13 grams of protein and 120 calories.

In the second communication ("The Soy Bean as an Article of Diet for Infants." *Journal of the American Medical Association*, May 21, 1910, p. 1,664) I pointed out that this soy flour used as a gruel, or the beans themselves sufficiently cooked and used as a gruel, was of value in certain cases. Still later Dr. Julius Friedenwald and myself ("The Use of the Soy Bean as a Food in Diabetes." *American Journal of the Medical Sciences*, December, 1910) showed that the bean and the gruel were used to great advantage in cases of diabetes, both in adults and in children, although our experience with the latter is practically limited to one case. I have also another article, as yet not published, on the soy bean cookery, showing how the bean and the flour may be prepared as a food for human beings.

The bean has received attention from time to time in other countries, and two of the most recent contributions came from Germany and France. The first suggestion comes in the form of a patent flour made by Bayer & Company and patented in this country. This is made by treating the beans with boiling water and 0.5 per cent. of sodium bicarbonate until the carbohydrates and other water soluble substances are removed. The residue after being dried and pulverized is a yellow powder containing the nutritive fatty and protein constituents of the beans. Goff (*Gaz. des Hop.*, March 7, 1911, p. 399. *Le soja dans l'alimentation des diabetiques*) has published an article describing the soy bean and pointing out its use as a food for diabetics, and also gives a number of recipes for the preparation of various dishes made from them.

Briefly stated, the uses of the soy bean are as follows:—

First, in the form of dilute gruels either with or without the

addition of some starchy flour, as barley flour, in summer diarrheas and in certain forms of intestinal indigestion. These gruels are well borne in some cases where nothing else seems to agree. Later the condensed milk or cow's milk may be added to the gruel. From one to two level tablespoonfuls to the quart is usually sufficient to start with, and this may be increased to four level tablespoonfuls to the quart and, in some instances, may be made even stronger. As a general rule, this is well borne. In some instances, particularly if the soy flour is used alone or in too strong gruels, it may cause foul-smelling stools and evidences of intestinal putrefaction. This rarely happens if dilute gruels are used or if a certain amount of starch is added. Usually the stools are smooth and have the appearance of those of children fed on malted milk.

The second class of cases are those in which cow's milk disagrees and in which there is difficulty in finding any food containing sufficient nutriment to nourish the child. The soy bean, barley and condensed milk mixtures may be used in these cases to great advantage, and, in several instances, in which children have been fed for eight or ten months on these mixtures, the results have been surprisingly good. Orange juice or some other fresh fruit juice is advisable from time to time to prevent any tendency to scurvy.

Thirdly, in diabetes this food is of great value and serves two purposes. First, it may be prepared in a number of different ways and relieves the tedium of the ordinary diabetic diet to a very great extent, and, secondly, as Friedenwald and I have shown, the use of the bean tends to lessen the glycosuria, especially when used in connection with strict diabetic diets.

I feel that the soy bean has a very definite future assured for it, and it is chiefly for this reason that I again call your attention to it as an article of diet for infants.

THE BACILLUS OF SCARLET FEVER.

At the request of Dr. A. E. Vipond the following is inserted:—

The further investigation of the bacillus described by Dr. A. E. Vipond in his paper on "Scarlet Fever" gives the following: The bacillus is not a gas producer and forms no acid on mannite or lactose and, further, the bacillus is found to be gram positive.

SUGARS IN INFANT FEEDING WITH SPECIAL REFERENCE TO THE MALTOS-DEXTRIN PREPARATIONS.

BY JEROME S. LEOPOLD, M.D.,
New York City.

The importance of the sugar content in milk mixtures used in the artificial feeding of infants has long been recognized. Years ago Escherich showed that milk sugar caused intestinal fermentation and that it was a frequent cause of diarrhea in infants. More than fifty years ago Jacobi believed that milk sugar often caused intestinal disturbances in infants, and advocated the use of cane sugar in infant feeding in preference to the commonly used milk sugar.

It was Finkelstein, however, who first called attention to the important rôle that the various sugars played in infant feeding. As a result of numerous clinical observations, he concluded that what he termed "alimentary fever" was often due to the ingestion of sugar. Fever, he says, can be caused by sugars alone, without the action of bacteria or toxins. He showed that sugar—whether it be lactose, maltose, saccharose, or glucose—when given with a food, might cause elevated temperature and dyspeptic stools in infants. This elevated temperature would drop to normal again and the stools would lose their dyspeptic appearance as soon as the sugar had been removed from the feeding. Finkelstein also showed that a very small amount of sugar can cause the severest grade of "alimentary intoxication," in susceptible infants—that is to say, in infants whose intestinal wall had been in any way injured.

The sugars commonly used in infant feeding are lactose or milk sugar, saccharose or cane sugar, and maltose or malt sugar. Malt sugar, on account of its high price, is not used as such in infant feeding, but in combination with dextrin.

These three sugars are all disaccharides and must be acted upon and changed by their ferments into monosaccharides before they can be utilized by the body. Lactose and saccharose are converted in the intestine by their respective ferments, lactase and saccharase (invertase) into monosaccharides and are then absorbed. These two ferments, lactase and saccharase, occur *exclusively* in the intestinal tract. If any lactose or saccharose then

pass through the intestinal wall or be injected subcutaneously, it would pass through the kidney and appear as such in the urine. (Voit, Leopold and von Reuss.) The ferment maltase, however, which converts maltose into its monosaccharides, occurs in the intestine and also in other parts of the body; consequently maltose can be acted upon by its ferment, not only in the intestine but also if it passes through the intestinal wall or if it is injected subcutaneously. This may account for the fact that the power of assimilation of the body for maltose is much greater than for lactose or saccharose. Another advantage of maltose is its rapid absorption as compared with lactose or saccharose; hence the lesser tendency to fermentation. An infant can tolerate larger quantities of maltose than of either lactose or saccharose without sugar appearing in the urine. This tolerance for maltose has been demonstrated to be twice as high as for lactose or saccharose. (Czerny-Keller.)

From these facts alone one would suppose that malt sugar or its preparations would be the most desirable for use in infant feeding. A glance through the literature, however, readily shows that opinions are by no means unanimous as to which sugar is the best for infant feeding. In Germany, malt sugar preparations are now being used almost exclusively in milk dilutions. According to the text-books that have appeared in the past few years (Heubner, Czerny-Keller, etc.), the use of milk sugar is still recommended. Langstein-Meyer and Finkelstein, in the most recently published book on infant feeding, however, recommends the maltose-dextrin preparations. American authors, with the exception of Jacobi, mention more particularly milk sugar in their text-books. Koplik and Abt, among others, have of late employed the maltose preparations. If we consult the literature further, we see that many authors praise the qualities of lactose, while others say that saccharose or maltose is the best.

In view of this diversity of opinion, it seemed to me well worth while to test experimentally the effect of the various sugars on a large number of infants. The results of my studies appeared in German in a recent article entitled "The Action of Various Sugars in the Nutritional Disturbances of Nurslings." (*Zeit f. Kind.*, I., No. 3.)

In my experiments I considered the question of the effect on the temperature, weight curve and stools which the various sugars would have when given by mouth. I used chemically pure lactose,

maltose, saccharose and glucose, "Soxhlet's Nährzucker" (which is composed of maltose 52.44 per cent., dextrin 41.26 per cent., and sodium chloride 2 per cent.) and "Loeflund's nährmaltose" (maltose 40 per cent., dextrin 60 per cent., salts 0.3 per cent.) were also used. My experiments were made on young infants, mostly under three months of age, because of their well-known susceptibility to digestive disturbances.

From my studies, I came to the conclusion that a combination of about equal parts of maltose and dextrin was the sugar preparation that was borne best in the artificial feeding of infants. I showed that the maltose-dextrin preparations caused dyspeptic stools and rise in the temperature much less frequently than either lactose, saccharose, glucose or maltose. It was also shown that a gain in weight was obtained in a greater number of cases by maltose-dextrin preparations than by any of the other sugars.

Although the good effects of these maltose-dextrin preparations have been known for some time in America, there has been no American-made product on the market.

Some time ago, feeling that there was need of an American-made product of maltose and dextrin, I had a preparation of about equal parts of maltose and dextrin made for me by the firm of Mead, Johnson & Company. This American preparation contains, according to my directions, maltose 51 per cent., dextrin 47 per cent., sodium chloride 2 per cent. It is called "dextri-maltose."

During the past few months I have had occasion to determine the value of this maltose-dextrin preparation at my milk station of the New York Milk Committee, and also at the Post-Graduate Hospital. The following cases will illustrate its effect on the nutrition of some of these infants.

CASE I. E. M., age seven months, weight 10 pounds, 9 ounces. Poorly developed child. Put on a mixture of about equal parts of milk and barley water, with 1 and $\frac{1}{2}$ ounces of cane sugar. I did not see the child again for two months, during which time it had gained only 2 ounces. It was then put on the same feeding, except that "dextri-maltose" was substituted for the cane sugar. During three weeks the child has gained 1 pound, the bowels have been good, and the general condition has become much improved.

CASE II. W. D., age nine months, weight 10 pounds, 11 ounces. Poorly developed child. Cries a good deal. Bowels in

good condition. Put on a mixture of equal parts of milk and barley water, with 1 ounce of cane sugar. During the following week the infant gained 10 ounces, and then lost 1 ounce during the next fourteen days. It was then put on about the same mixture, with the exception that "dextri-maltose" was used instead of cane sugar. During the first week on this "dextri-maltose" mixture it gained 14 ounces, and during a period of observation of eight weeks on this mixture it has gained 4 pounds, an average of 8 ounces a week. The bowels have always been good, and its general health has improved considerably.

CASE III. C. S., aged five weeks, weight 7 pounds, 15 ounces. Rather well developed child. Physical condition negative. Child very pale. Had been getting breast milk for four weeks, during which time it gained only 9 ounces. Put on a mixture of one part milk and two parts barley water, with $\frac{1}{2}$ ounce of cane sugar, for three weeks. During this time the infant gained only 3 ounces. It was then given a mixture of half milk and half barley water, with $\frac{1}{2}$ ounce of cane sugar for three weeks. During this time it gained 1 pound. The sugar was then increased to 1 ounce, and during the next ten weeks the infant gained 3 pounds, a weekly gain of about 5 ounces. It was then given the same mixture, but "dextri-maltose" was substituted for cane sugar. During five weeks the infant gained about 5 ounces weekly. Cane sugar was then substituted for "dextri-maltose" for one week, during which time the infant lost 4 ounces. It was then put on "dextri-maltose" again, and gained 5 pounds and 4 ounces in fifteen weeks, or nearly 6 ounces per week. It was then put on cane sugar for one week, during which time the infant gained only 2 ounces. "Dextri-maltose" was again substituted for the cane sugar, and the infant gained 13 ounces in one week.

The stools have remained normal during all this time, and the infant's general condition has improved remarkably.

CASE IV. H. T., age two weeks, weight 6 pounds, 9 ounces. Breast milk for two weeks, then mother had to stop nursing. Child was put on a mixture of about one part milk to two parts water, with $\frac{1}{2}$ ounce cane sugar. It was kept on the cane sugar for one week, during which time the child had dyspeptic stools and gained 1 ounce. During the next week "dextri-maltose" was substituted for the cane sugar. The stools became good at once, and the child gained 7 ounces in weight.

CASE V. B. S., three months, weight 6 pounds, 9 ounces,

Under-developed child. Did poorly on the breast alone and lost a good deal of weight. Mother had very little breast milk. Child was given two feedings of breast milk and four feedings of half milk and half barley water, with 1 ounce of "dextri-maltose." During six weeks' observation, the child has gained 2 pounds and 12 ounces, or over 7 ounces each week. The bowels have remained good, and the general condition has been much improved.

CASE VI. L. E., age four months, weight 8 pounds, 6 ounces. Child has been getting the breast since birth. For the past few weeks it has been steadily losing weight. Pale, atrophic child with an umbilical hernia. Slight bronchitis. Was given the breast every three hours, with the addition of a mixture of half milk and half water with "dextri-maltose." During two weeks' observation the child has gained 8 ounces, or 4 ounces weekly. The general condition has improved very much.

CASE VII. J. S., age nine months, weight 11 pounds, 12 ounces. For seven months past the infant has received under my observation various milk mixtures with cane sugar. During this period of seven months it had gained 4 pounds and 12 ounces, an average weekly gain of about 2½ ounces. "Dextri-maltose" was then substituted for the cane sugar. During a period of seven weeks the child gained 2 pounds and 1 ounce, an average weekly gain of almost 5 ounces. It was then put on full milk, soup, gruels, fruit, etc., and has been gaining steadily ever since.

From the effect on these infants, I have been satisfied that the American-made product is equal to the German preparation as far as the gain in weight, the beneficial effect on the stool and the general condition of the patient are concerned. All of my cases are still under observation. Later on I hope to make a more complete report on a larger number of cases.

701 Madison Avenue.

INVESTIGATION OF THE ACTION OF SODIUM BENZOATE IN ARTIFICIALLY-FED INFANTS.

BY CLIFFORD G. GRULEE, A.M., M.D.,

AND

WALTER H. BUEHLIG, S.B., M.D.,

Chicago.

During 1908 the Referee Board of Consulting Scientific Experts investigated the subject of the action of sodium benzoate on the human organism. The subjects in these experiments in Chicago were six young adults in average good health. Since the question of the action of this preservative on young infants has been raised we decided, on suggestion of Professor J. H. Long, to investigate the effect of sodium benzoate on infants fed artificially. The work as planned consisted of two parts:—(1) determinations of the general action of sodium benzoate on the bacteria in milk, and (2) clinical observations on infants fed artificial milk mixtures containing sodium benzoate.

As a corollary to the clinical observations the effect of sodium benzoate upon the increase in the total number of bacteria in milk was tested. The general plan of this procedure was to divide the milk into three parts—one part to be the control, the second to contain .1 per cent. sodium benzoate added immediately before the milk was diluted for plating, and the third to contain benzoate in the proportion of 1 grain to 6 ounces of milk. At intervals of twenty-four hours the milks were plated again and in the meantime were kept in the ice-box unless otherwise specified. Agar-agar was used in plating. The work was done during July and August of 1909. Certified and good market milk were employed, as can readily be seen by the beginning counts, and also milk and sugar and barley water mixtures. In each experiment a different milk was used. Unless otherwise stated, milks were sweet and not coagulated.

Following are the results of the platings, the figures representing the number of bacteria per c.c.:—

No. of Exp.	Samples of Milk	Beginning Count	After 24 Hours	After 48 Hours	After 72 Hours
I	Control	98,000	Too thick to count	Too thick (curdled and sour)	
I	1/10% benzoate	210,000	Too thick to count	Too thick (not curdled, sweet)	
I	1 gr. to 6 oz.	94,000	Too thick to count	Too thick (not curdled, sweet)	
II	Control	106,000	2,900,000	1,830,000 (curdled and sour)	
II	1/10% benzoate	184,000	5,400,000	4,900,000 (curdled and sour)	
II	1 gr. to 6 oz.	120,000	3,400,000	4,100,000 (curdled and sour)	
III	Control	330,000	4,700,000	7,200,000 (sour and coagulated)	7,000,000 (sour; much curdled)
III	1/10% benzoate	310,000	2,800,000	7,000,000	6,100,000 (sour; curdled a little)
III	1 gr. to 6 oz.	230,000	3,400,000	6,300,000	6,500,000 (sour; much curdled)
IV	Control	3,900	140,000	5,600,000 (sour and coagulated)	7,000,000 (sour; much curdled)
IV	1/10% benzoate	6,000	124,000	4,100,000	5,600,000 (sour; some curds)
IV	1 gr. to 6 oz.	7,700	130,000	4,700,000	5,000,000 (sour; much curdled)

Experiments V.-VIII. inclusive were made with mixtures of milk, cane sugar and barley water, containing the following pro-

No. of Exp	Samples of Milk	Beginning Count	After 24 Hours	After 48 Hours	After 72 Hours
V	Control	85,000	880,000	3,500,000 (sour; markedly coag.)	2,400,000 (sour and coagulated)
V	1/10% benzoate	54,000	720,000	3,100,000 (coagulated?)	4,200,000 (sweetish; slight coagulation)
V	1 gr. to 6 oz.	52,000	580,000	2,800,000 (slight coagulation)	2,800,000 (slightly sour and coagulated)
VI	Control	93,600	Broken	1,400,000 (markedly coagulated and sour)	4,200,000 (sour)
VI	1/10% benzoate	109,000	840,000	Too thick (coagulated?; sour?)	4,900,000 (sweet?; coagulated?)
VI	1 gr. to 6 oz.	78,000	1,000,000	1,900,000 (slight coagulation and sour)	2,800,000 (slightly sour; slight coagulation)
VII	Control	4,000	6,000	62,000	
VII	1/10% benzoate	1,400	6,000	15,000	
VII	1 gr. to 6 oz.	2,500	5,000	240,000	
VIII	Control	12,000	80,000	280,000	
VIII	1/10% benzoate	6,500	120,000	200,000	
VIII	1 gr. to 6 oz.	10,000	85,000	240,000	

portions: 3 ounces milk, 5 ounces barley water and 5 grams of sugar. This is a fair example of the feedings given a young infant.

In Experiments VII. and VIII. the milk was kept on the ice in the ice-box. Other samples had been kept only in the ice-box below the ice chamber.

To obtain a rough idea of the action of benzoate on milk with very few bacteria the following was tried (during March, 1910):—

A pint of milk was just brought to a boil and divided into two equal parts. One part (*a*) was put into a milk bottle and $\frac{1}{10}$ per cent. benzoate was added. The second part (*b*) was likewise treated and 10 c.c. of milk (containing about 8,000 bacteria per c.c.) added with the same amount of benzoate. Ordinary cleanliness only was employed throughout. The plan was to get a milk with (*a*) very few bacteria and with (*b*) a larger number but still relatively few bacteria. The second part (*b*) was sweet until the eighth day, when it curdled and became sour. The first part was sweet beyond the twelfth day. These bottles of milk were kept at room temperature and were covered with one layer of filter paper throughout the time of observation.

From these experiment we may deduce the following:—

(1) That when milk contains sodium benzoate in proportion of 1 grain to 6 ounces of milk (approximately .04 per cent.), or in .1 per cent. strength, the number of bacteria in milk at twenty-four hour intervals does not materially differ from the number in control milks.

(2) That sodium benzoate in the above-mentioned strengths must have a slight effect in inhibiting some kinds of bacteria, because of the difference in the time the milks became sour and coagulated.

(3) That sodium benzoate seems to be a fair preservative only when very few living bacteria are present.

For the clinical observations babies were chosen who came daily to the Provident Hospital Diet Kitchen for food and treatment. This diet kitchen was in the control of a trained nurse, who previous to her service there had served an apprenticeship in the Northwestern University Medical School Infants' diet kitchen. All the milk used was the best certified milk (from the Arcady farm) which could be obtained, and each feeding was put up in a bottle (sterile precautions being observed) and closed with

a sterile cotton stopper. The mother was instructed to boil each nipple before using, to warm the milk, and neither to pour out the milk into another vessel nor to save for another time such amount as the child might leave in the bottle.

All cases studied are included in this report, and on these the observations lasted for several weeks or months. In each class in the beginning a *half grain* of sodium benzoate was added to each feeding and continued until July 15, 1909, at which time the amount was increased to *one grain*. As it is our custom never to give more than five feedings in twenty-four hours, this would amount at first to $2\frac{1}{2}$ grains a day, and later to 5 grains. The case histories and weight curves follow:—

CASE I. Baby Geraldine S., colored, age eight months, entered the dispensary first on January 9, 1909. Father and mother both living and well. There were 3 other children, of which 2 were dead, one of pulmonary and glandular tuberculosis and one of bronchitis(?). The living child at home coughed a great deal and had never been well. There was no other definite history of tuberculosis in the family. The child was born at full term, with a normal delivery, and birth weight was between 10 and 11 pounds (statement of mother). Until four months of age the child was breast fed.

The mother brought the child because of a cough and vomiting after eating. Bowels were very constipated, stools hard and white, making it necessary to use castor oil. Child was being fed every three or four hours, sometimes oftener, on a mixture consisting of milk three-quarters and barley and oatmeal water one-quarter, amount not stated.

Examination.—Weight, 15 pounds, 6 ounces; dentition delayed; rachitic rosary; pharyngitis; chest negative.

Diagnosis.—Milk overfeeding ("Milk nährschaden"), rachitis and pharyngitis. For the pharyngitis and cough, emulsion of cod liver oil, a teaspoonful three times a day, was given. To correct the diet the child was referred to the diet kitchen. Food consists of dilutions of whole and skimmed milk with various carbohydrates, especially malt extract, cane sugar and oatmeal.

No special change in symptoms occurred, except that the cough grew rapidly better. Marked constipation continued for months, due seemingly to a lack of muscular action in the bowel, since the stool was usually soft. The vomiting seemed to depend upon the amount of mucus produced by the pharyngitis and swallowed,

since as soon as this was decreased the vomiting ceased, and at each succeeding time when she had a large secretion of mucus vomiting resulted, not following the cough, but the ingestion of food. Later, when the child was suffering with bronchitis, the vomiting was so severe that relief only came if the stomach was washed out before each feeding.

March 13th a half grain of sodium benzoate was added to each feeding ($2\frac{1}{2}$ grains in twenty-four hours) and continued until July 15th, with the exception of May 13th and 14th, when the benzoate was discontinued to see if its presence had any influence on the vomiting, but it was found that it affected it in no way whatever. From the 4th of March until the 3d of April the child remained away from the clinic because of a severe whooping-cough (?),* coming twice in that time after clinic hours to be weighed.

4-3-09. Temperature 100.4°F. , cough better, stools decreased in number, soft yellow, some mucus; vomiting very marked. Food formula.—Milk, 18 ounces; skimmed milk, 2 ounces; barley water, 20 ounces; milk sugar, 1 ounce; malt extract, 1 ounce—5 x 8. Weight, 14 pounds, 10 ounces.

4-13-09. Vomiting nearly ceased. One yellow stool a day, some mucus, no curds. Some cough, some mucus in throat. Emul. Ol. Morr. three times a day. Milk, 20 ounces; vegetable soup, 20 ounces; Cane sugar, $\frac{1}{2}$ ounce; malt extract, 1 ounce; oatmeal, 1 ounce—5 x 8. Weight, 15 pounds, 8 ounces.

4-24-09. Constipated. No cough, no vomiting. Weight, 15 pounds, 10 ounces.

5-6-09. Very constipated for past two days. Vomiting with a severe cough for past two days. Temperature, 100°F. Râles all over chest. Slight dullness over left lower lobe posteriorly. Diagnosis.—Bronchitis. Milk, 15 ounces; vegetable soup, 25 ounces; cane sugar, $\frac{1}{2}$ ounce; malt extract, 1 ounce; oatmeal, $\frac{1}{2}$ ounce—5 x 8. Weight, 16 pounds, 2 ounces.

5-7-09. Temperature (taken by visiting nurse), 102°F. Barley water, 40 ounces—5 x 8.

5-8-09. Fine râles over lungs posteriorly. Much mucus, excessive vomiting. Bismuth subnitrate (grains *iii*) before each feeding. Temperature, 99.8°F. Milk, 10 ounces; vegetable soup, 30 ounces; cane sugar, $\frac{1}{2}$ ounce—5 x 8. Weight, 15 pounds, 5 ounces.

* Mother's statement. Must have been spasmodic croup, as whooping-cough came later.

5-11-09. Seems better; râles fewer; temperature, 100°F . Vomiting gradually became less and ceased on 5-18-09. Milk, 15 ounces; vegetable soup, 25 ounces; cane sugar, $\frac{1}{2}$ ounce—5 x 8. Weight, 14 pounds, 12 ounces.

5-18-09. Milk, 20 ounces; vegetable soup, 20 ounces; cane sugar, 1 ounce—4 x 10. Weight, 15 pounds, 7 ounces.

5-28-09. Given $\frac{1}{2}$ graham cracker after each feeding. Weight, 16 pounds, 12 ounces.

On 6-17-09 another coughing attack, with much mucus and much vomiting. This proved to be a severe case of pertussis which lasted until about the middle of July. Weight, 16 pounds, 1 ounce.

On 6-26-09 stomach contents showed mucus in excess, trace of lactic acid and marked decrease of HCl. Stomach washing and grains iii of bismuth subnitrate ordered before each feeding. Weight, 16 pounds, 5 ounces. From the middle of July until the 12th of August the child was perfectly well. Then occurred a slight attack of diarrhea lasting three days, with some vomiting, but with rapid recovery. Ceased to get food at diet kitchen 9-2-09.

From July 15th to September 2d 1 grain of sodium benzoate was added to each feeding. Weight as follows:—

7- 3-09.....	17 pounds, 5 ounces
7-13-09.....	17 " 12 "
8- 2-09.....	18 " 6 "
8-11-09.....	18 " 14 "
9- 3-09.....	19 " 15 "

On 9-24-09 child was given four feedings of 5 ounces each of whole milk with cereals, graham crackers, etc., at home.

We have here a child with a disturbance of nutrition and one in which repeated affections of the respiratory tract were accompanied by vomiting which could only be relieved by gastric lavage. The vomiting persisted when the sodium benzoate was not added to the food, and ceased although it was again added. It is hardly possible that the vomiting can be attributed to the presence of sodium benzoate, but must either be due to a reflex from the cough or to the irritation caused by the pharyngeal mucus or bacteria coming in contact with the gastric mucosa.

CASE II. Baby Dorothy L., aged three months, first seen February 4, 1909.

Father and mother and three other children were living and

well. One child had died of whooping-cough, one of meningitis (?), and one died at birth. Patient was a full term child with normal delivery, weight at birth unknown. She was exclusively breast fed for four weeks. Then given breast and oatmeal gruel at irregular intervals. Mother brought the child because of a discharge from the ear and some emaciation. The mother was instructed to give the baby only the breast at four-hour intervals. Weight, 9 pounds, 2 ounces.

2-8-10. Bowels were normal; child got 3 ounces from breast at nursing. Child seemed normal until March 23d, when history of "croup" was obtained and Emul. Ol. Morr. 5i three times a day was given. Weight, 9 pounds, 4 ounces.

Sodium benzoate (grain $\frac{1}{2}$) was added to each feeding, beginning March 13th, at which time child was getting three bottles, or $1\frac{1}{2}$ grains of the benzoate; on March 27th this was increased to 4 bottles, or 2 grains; and on April 9th to 5 bottles, or $2\frac{1}{2}$ grains. No symptoms of any kind except constipation were noted until May 18th, when the child vomited a little, was still constipated, and had a temperature of 98.2°F (rectal). Still some vomiting on the 20th. Child not seen again until June 5th, when all vomiting had ceased. Child had an acute attack of diarrhea on June 2d, with prompt recovery. On July 15th the sodium benzoate was increased to 1 grain to a bottle, or 5 grains a day. During the night of July 22d the baby had an attack of diarrhea and vomiting, with high fever and five green, slimy stools. She was seen on the morning of July 23d, when she showed a temperature of 98.8°F ., some laryngeal stridor, and was very cross. On July 24th the stools were still rather soft and greenish brown; temperature, 98.8°F . After this time the only symptom which the child had until September 7th was constipation. During the writer's absence from the city the mother reported that the baby had had an acute attack of vomiting during the night and she discontinued getting food at diet kitchen.

2-13-09. Milk, $2\frac{1}{2}$ ounces; water, $2\frac{1}{2}$ ounces; cane sugar, $\frac{1}{4}$ ounce—1 x 5.

2-16-09. Milk, 7 ounces; water, 8 ounces; cane sugar, $\frac{1}{2}$ ounce—3 x 5. Weight, 9 pounds, 3 ounces.

2-27-09. Milk, 6 ounces; water, 9 ounces; cane sugar, $\frac{1}{2}$ ounce—3 x 5. Weight, 9 pounds, 8 ounces.

3-23-09. Milk, 6 ounces; water, 9 ounces; cane sugar, $\frac{1}{2}$ ounce—3 x 5. Weight, 9 pounds, 12 ounces.

3-27-09. Milk, 10 ounces; water, 10 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, $\frac{3}{4}$ ounce—4 x 5. Weight, 9 pounds, 13 ounces.

4-9-09. Milk, 12 ounces; water, 13 ounces; milk sugar, 1 ounce; malt extract, 1 ounce—5 x 5. Weight, 9 pounds, 15 ounces.

4-15-09. Weight, 10 pounds.

4-24-09. Weight, 10 pounds, 7 ounces.

5-18-09. Milk, 14 ounces; water, 16 ounces; milk sugar, 1 ounce; malt extract, $\frac{3}{4}$ ounce—5 x 6. Weight, 10 pounds, 3 ounces.

5-19-09. Milk, 14 ounces; water, 16 ounces; milk sugar, 1 ounce; malt extract, 1 ounce—5 x 6.

6-1-09. Milk, 16 ounces; water, 14 ounces; milk sugar, 1 ounce; malt extract, $\frac{3}{4}$ ounce—5 x 6. Weight, 10 pounds, 11 ounces.

6-3-09. Acute intoxication. Barley water, 30 ounces—5 x 6.

6-4-09. Milk, 12 ounces; water, 18 ounces; milk sugar, 1 ounce; malt extract, $\frac{3}{4}$ ounce—5 x 6. Weight, 10 pounds, 4 ounces.

6-5-09. Milk, 12 ounces; skimmed milk, 4 ounces; water, 14 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $\frac{1}{2}$ ounce—5 x 6.

6-21-09. Weight, 10 pounds, 6 ounces.

6-29-09. Milk, 14 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, $\frac{3}{4}$ ounce; barley water, 16 ounces—5 x 6. Weight, 10 pounds, 6 ounces.

7-6-09. Skimmed milk, 14 ounces; barley water, 16 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $\frac{1}{2}$ ounce—5 x 6. Weight, 10 pounds, 4 ounces.

7-13-09. Milk, 2 ounces; skimmed milk, 12 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $\frac{3}{4}$ ounce—5 x 6. Weight, 10 pounds, 1 ounce.

7-20-09. Skimmed milk, 14 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $\frac{3}{4}$ ounce; oatmeal, 1 ounce—5 x 6. Weight, 10 pounds, 1 ounce.

7-23-09. Barley water, 30 ounces—5 x 6.

7-24-09. Skimmed milk, 12 ounces; water, 18 ounces—5 x 6.

7-25-09. Milk sugar, $\frac{1}{4}$ ounce added.

7-27-09. Milk sugar increased to $\frac{1}{2}$ ounce. Weight, 9 pounds, 12 ounces.

7-30-09. Skimmed milk, 12 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, $\frac{1}{2}$ ounce; water, 18 ounces—5 x 6.

7-31-09. Skimmed milk, 12 ounces; water, 18 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, 1 ounce—5 x 6.

8-3-09. Milk, 3 ounces; skimmed milk, 9 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, 1 ounce; water, 18 ounces—5 x 6. Weight, 9 pounds, 9 ounces.

8-7-09. Milk, 5 ounces; skimmed milk, 12 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, 1 ounce; water, 18 ounces—5 x 7.

8-10-09. Weight, 9 pounds, 13 ounces.

8-19-09. Milk, 7 ounces; skimmed milk, 10 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, 1 ounce; water, 18 ounces—5 x 7. Weight, 9 pounds, 11 ounces.

8-21-09. Milk, 9 ounces; skimmed milk, 9 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, 1 ounce; water, 18 ounces—5 x 7.

8-26-09. Milk, 9 ounces; skimmed milk, 4 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, 1 ounce; barley water, 24 ounces—5 x 7. Weight, 9 pounds, 9 ounces.

9-1-09. Weight, 9 pounds, 8 ounces.

9-7-09. Barley water, 35 ounces—5 x 7.

9-9-09. Skimmed milk, 23 ounces; barley water, 12 ounces—5 x 7.

We have here a baby showing rather frequent attacks of vomiting and diarrhea, which rarely lasted longer than twenty-four hours and which evidently had no connection with administration of the sodium benzoate, since this was continued in the diet in equal amount during the period of recovery. In the intervals between these attacks the baby was nearly always constipated. The weight curve is certainly not a good one, but it is hard to fancy that this can in any way be due to sodium benzoate when we see the intolerance of the child for even the most carefully regulated diet.

CASE III. Lillian W., aged six months. First seen March 25, 1909.

History.—Father and mother alive and well. There were no other children, and no miscarriages. Patient was a full term child, normal delivery. She had been breast fed exclusively for a little more than a month, then for three months on oatmeal water sweetened with sugar (positively nothing else), and after that on condensed milk. She had been fed about every two hours. Bowels moved two to four times a day, were bright-yellow,

curdy and of bad odor, containing no mucus or blood. Child slept well during the day, but cried a great deal at night. She had had a cough for about a week. Abdomen was distended in the morning before bringing to clinic.

Examination.—Nasal discharge; slight stomatitis; base of nose depressed; head large; anterior fontanel wide open; occipito-frontal circumference $15\frac{1}{2}$ inches; chest negative, spleen not palpable.

Baby was given $\frac{1}{2}$ grain of sodium benzoate in the food, or $2\frac{1}{2}$ grains per day, from the time of entrance until July 15th, when it was increased to 1 grain per bottle, or 5 grains per day. The child remained perfectly well, with no untoward symptoms whatever until July 26th, when the mother brought the child to the clinic with a temperature of 104.4°F . Pressure at that time over the external auditory meatus seemed to elicit pain and a tentative diagnosis of otitis media was made, which was later confirmed on examination by Dr. Norcross. It was not thought advisable to pierce the tympanic membrane and local treatment was applied. In spite of the apparent recession of the otitis media the temperature remained high.

The child was next seen on July 31st, when a specimen of urine showed much *pus*. Temperature, 102.2°F .; very cross, marked pallor; white blood corpuscles, 28,200. She was given 2 grains of urotropin three times a day. By August 12th the temperature had returned to normal and all symptoms had disappeared, except that the urine still contained a little *pus*. Temperature after this remained 100°F . or under, and child made rapid recovery. On October 9th, when last seen, baby was in every way perfectly well.

3-25-09. Milk, 11 ounces; water, 14 ounces; milk sugar, 1 ounce—5 x 5. Weight, 9 pounds, 7 ounces.

3-27-09. Milk, 14 ounces; water, 16 ounces; milk sugar, 1 ounce—5 x 6.

4-1-09. Weight, 9 pounds, 9 ounces.

4-8-09. Weight, 9 pounds, 15 ounces.

4-15-09. Weight, 10 pounds, 2 ounces.

4-22-09. Weight, 10 pounds, 15 ounces.

5-7-09. Milk, 16 ounces; water, 19 ounces; milk sugar, 1 ounce—5 x 7. Weight, 11 pounds, 3 ounces.

5-14-09. Weight, 11 pounds, 10 ounces.

5-21-09. Weight, 11 pounds, 11 ounces.

- 5-30-09. Weight, 11 pounds, 13 ounces.
 6-19-09. Weight, 13 pounds, 11 ounces.
 6-26-09. Weight, 14 pounds, 2 ounces.
 7-2-09. Milk, 18 ounces; water, 17 ounces; milk sugar, 1 ounce—5 x 7. Weight, 14 pounds, 4 ounces.
 7-9-09. Weight, 14 pounds, 8 ounces.
 7-16-09. Weight, 14 pounds, 12 ounces.
 7-24-09. Milk, 20 ounces; water, 20 ounces; milk sugar, 1 ounce—5 x 8. Weight, 14 pounds, 11 ounces. Pyelocystitis.
 7-31-09. Weight, 14 pounds, 1 ounce.
 8-4-09. Weight, 13 pounds, 14 ounces.
 8-12-09. Weight, 14 pounds, 8 ounces.
 8-19-09. Weight, 13 pounds, 12 ounces.

In this case the only condition which comes to our notice during the administration of the sodium benzoate is the pyelocystitis. Since, among other qualities, sodium benzoate is regarded as a urinary antiseptic, it would be hard to conceive of that drug's having been even remotely the cause of this condition.

CASE IV. Baby E. S., aged one year. First seen April 6, 1909.

Father and mother and one other child were alive and well; no miscarriages. Child was born at full term with normal delivery; weight at birth, 10½ pounds; breast fed six months. irregular intervals, about every two to three hours; after that given gravy, potatoes, oranges, etc., as much as the child would take, together with some breast milk. Child has had a "cold" continuously. Six weeks ago child began to have extreme flexion of the feet and hands. Cried all the time.

Examination.—Rachitic rosary and epiphyseal enlargement; hands and feet in position of typical carpopedal spasm (tetany). Facial phenomenon present, more marked on left side. The child was taken into hospital. This was a typical case of tetany, which cleared up rapidly and was discharged April 20th in good condition.

From April 6th to July 15th the baby received ½ grain sodium benzoate per bottle or 2 grains in twenty-four hours; after July 15th until December 12th 1 grain per bottle, or 4 grains in twenty-four hours.

Throughout its convalescence this child was constipated. On May 9th the child developed a rather severe bronchitis, during which the temperature rose as high as 103°F., and there was

vomiting. By May 20th the child had recovered and ran a perfectly normal course until December 12th, when it returned with another distinct attack of tetany brought on by the attempt to nourish the child with potatoes, gravy, etc., done on the advice of a medical colleague.

4-6-09—4-23-09. Fed on mixture of whole milk and skimmed milk curds suspended in barley water.

4-6-09. Weight, 16 pounds, 12 ounces.

4-7-09. Weight, 16 pounds, 13 ounces.

4-12-09. Weight, 15 pounds, 12 ounces.

4-14-09. Weight, 15 pounds, 8 ounces.

4-17-09. Weight, 15 pounds, 12 ounces.

4-19-09. Weight, 15 pounds, 9 ounces.

4-23-09. Skimmed milk, 5 ounces; curds of 11 ounces of skimmed milk; barley water, 30 ounces; milk sugar, 1 ounce; malt extract, 1 ounce.

4-24-09. Skimmed milk, 10 ounces; curds of 6 ounces of skimmed milk; barley water, 24 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $1\frac{1}{2}$ ounces.

4-27-09. Skimmed milk, 16 ounces; barley water, 24 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $1\frac{1}{2}$ ounces—4 x 10. Weight, 15 pounds, 8 ounces.

5-1-09. Skimmed milk, 12 ounces; milk, 8 ounces; water, 20 ounces; cane sugar, $\frac{1}{4}$ ounce; malt extract, 1 ounce; oatmeal, 2 ounces—4 x 10.

5-8-09. Skimmed milk, 10 ounces; milk, 10 ounces; water, 20 ounces; cane sugar, $\frac{1}{4}$ ounce; malt extract, 1 ounce; oatmeal, 2 ounces—4 x 10. Weight, 15 pounds, 1 ounce.

5-9-09. Bronchitis. Milk, 15 ounces; water, 25 ounces; cane sugar, $\frac{1}{4}$ ounce; malt extract, 1 ounce; oatmeal, 2 ounces—4 x 10.

5-10-09. Milk, 10 ounces; water, 20 ounces; cane sugar, $\frac{1}{4}$ ounce; malt extract, 1 ounce; oatmeal, 2 ounces—4 x $7\frac{1}{2}$.

5-17-09. Milk, 15 ounces; water, 25 ounces; cane sugar, $\frac{1}{4}$ ounce; malt extract, 1 ounce; oatmeal, 1 ounce—4 x 10.

5-20-09. Weight, 14 pounds, 11 ounces.

5-25-09. Milk, 18 ounces; water, 22 ounces; cane sugar, $\frac{1}{4}$ ounce; malt extract, 1 ounce; oatmeal, 1 ounce—4 x 10. Weight, 14 pounds, 13 ounces.

6-18-09. Weight, 17 pounds.

8-5-09. Weight, 19 pounds, 2 ounces.

12-28-09. Weight, 23 pounds.

We have here a severe case of tetany one year old, in which certainly no symptoms can remotely be dependent on the sodium benzoate.

CASE V. Aged six months. First seen June 5, 1909.

The father and mother alive and well; no other children; no miscarriages. The child was born prematurely at seven months with normal delivery. The weight at birth was $4\frac{1}{2}$ pounds. It was fed at the breast for three months at irregular intervals. Then Borden's Malted Milk was given for one month; later barley water and milk for one month, and then to this was added condensed milk for 4 weeks every two hours at first, and, finally, every four hours. The child had had "colds" and bronchitis. It was brought to the clinic because of continuous cough, some discharge from ear, and to obtain proper food. There had been some vaginal discharge and snuffling at birth. The baby was constipated and vomited occasionally.

Examination.—Umbilical hernia; enlarged cervical glands; rachitic rosary and enlarged epiphyses; chest negative; no splenic enlargement; no discharge from ear noted; no signs of congenital syphilis.

An adhesive dressing was applied to umbilical hernia and the patient was given food from the diet kitchen.

The child ran a normal course with normal stools until June 15th, when they showed a few curds, and the child, according to statement of the mother, was very hungry. On the 17th the child was brought back suffering from laryngismus stridulus and was taken to the hospital.

While in the hospital the temperature at first was subnormal, then became normal and remained so. On the first day, June 17th, two colonic flushings were given. On June 18th Emul. Ol. Morr. Si three times a day was given. From this time the child showed steady improvement, no intestinal disturbance, and was discharged from the hospital on June 24th in good condition.

With the exception of a tendency to constipation (which was relieved by the use of orange juice and syrup from stewed prunes), and an occasional attack of nasopharyngitis, the baby remained well up to March 1, 1910.

This child received $\frac{1}{2}$ grain of sodium benzoate per bottle, or $2\frac{1}{2}$ grains in twenty-four hours, until July 15th; after that 1

grain per bottle, or 5 grains in twenty-four hours, until September 30th.

6-5-09. Milk, 13 ounces; water, 11 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, $\frac{3}{4}$ ounce—4 x 6. Weight, 11 pounds, 8 ounces.

6-9-09. Milk, 10 ounces; water, 14 ounces; milk sugar, $\frac{3}{4}$ ounces; malt extract, $\frac{3}{4}$ ounces—4 x 6. Weight, 11 pounds, 15 ounces.

6-13-09. Malt extract, removed from food.

6-15-09. Milk, 13 ounces; water, 11 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, $\frac{3}{4}$ ounce—4 x 6.

6-16-09. *Laryngismus stridulus*. Barley water, 30 ounces; milk sugar, $\frac{3}{4}$ ounce. Weight, 11 pounds, 5 ounces.

6-17-09. Skimmed milk, 10 ounces; water, 20 ounces—5 x 6

6-18-09. Weight, 11 pounds, 2 ounces.

6-20-09. Weight, 11 pounds, 2 ounces.

6-21-09. Skimmed milk, 12 ounces; water, 18 ounces; milk sugar, $\frac{1}{2}$ ounce—5 x 6. Weight, 11 pounds, 3 ounces.

6-22-09. Milk, 2 ounces; skimmed milk, 10 ounces; water, 18 ounces; milk sugar, $\frac{1}{2}$ ounce—5 x 6. Weight, 10 pounds, 12 ounces.

6-24-09. Milk, 4 ounces; skimmed milk, 8 ounces; water, 18 ounces; milk sugar, $\frac{1}{2}$ ounce—5 x 6. Weight, 10 pounds, 14 ounces.

6-26-09. Milk, 6 ounces; skimmed milk, 6 ounces; water, 18 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $\frac{1}{2}$ ounce—5 x 6. Weight, 11 pounds.

6-29-09. Milk, 10 ounces; skimmed milk, 5 ounces; water, 15 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $\frac{3}{4}$ ounce—5 x 6. Weight, 11 pounds, 1 ounce.

7-1-09. Milk, 12 ounces; skimmed milk, 3 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $\frac{1}{4}$ ounce; water, 15 ounces—5 x 6. Weight, 11 pounds.

7-10-09. Weight, 11 pounds, 5 ounces.

7-15-09. Milk, 15 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $\frac{1}{2}$ ounce; oatmeal, 1 ounce; water, 25 ounces—5 x 8.

7-17-09. Weight, 11 pounds, 3 ounces.

7-24-09. Weight, 11 pounds, 3 ounces.

8-4-09. Milk, 16 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, $\frac{1}{2}$ ounce; oatmeal, 1 ounce—5 x 8.

8-6-09. Weight, 11 pounds, 9 ounces.

8-8-09. Skimmed milk, 16 ounces; water, 24 ounces—5 x 8.

8-10-09. Milk, 4 ounces; skimmed milk, 12 ounces; milk sugar, $\frac{1}{2}$ ounce; water, 24 ounces—5 x 8.

8-14-09. Weight, 11 pounds, 6 ounces.

8-19-09. Milk, 8 ounces; skimmed milk, 8 ounces; milk sugar, 1 ounce; malt extract, $\frac{1}{2}$ ounce; water, 24 ounces—5 x 8.

8-21-09. Milk, 12 ounces; skimmed milk, 4 ounces; milk sugar, 1 ounce; malt extract, $\frac{1}{2}$ ounce; water, 24 ounces—5 x 8. Weight, 11 pounds, 2 ounces.

8-29-09. Weight, 11 pounds, 8 ounces.

9-4-09. Milk, 8 ounces; skimmed milk, 8 ounces; milk sugar, 1 ounce; malt extract, $\frac{1}{2}$ ounce; water, 24 ounces—5 x 8. Weight, 11 pounds, 9 ounces.

9-14-09. Milk, 12 ounces; skimmed milk, 4 ounces; milk sugar, 1 ounce; malt extract, $\frac{1}{2}$ ounce; water, 24 ounces—5 x 8.

9-24-09. Weight, 12 pounds.

9-30-09. Milk, 16 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, 1 ounce; water, 34 ounces—5 x 8. Weight, 12 pounds.

We have here a child with some gastrointestinal disturbance followed by a slight attack of laryngismus stridulus and slight constipation. There are no symptoms which point to any ill effects from sodium benzoate.

CASE VI. Annie M., aged twenty-two months. Seen June 30, 1909.

The mother and father and three other children are alive and well; no miscarriages; child born at full term, normal delivery, and breast fed for nine months. First seen August 17, 1908, when it had scabies.

The child was brought on June 30, 1909, because of burning on urination. The urine, of dark color and offensive odor, caused irritation on passing. The bowels moved five to six times a day, at first green, then yellow. This condition had existed for about two weeks. There was much loss of weight.

Examination.—Tonsils red and enlarged; further examination impossible because of resistance of baby. The child was given calomel, and was fed from diet kitchen. Received $\frac{1}{2}$ grain of sodium benzoate per bottle, or $2\frac{1}{2}$ grains a day until improvement, reaching a normal condition as to stools and temperature on July 10th. From then on the child was very cross, but the stools and temperature were normal. One graham cracker a day was added to the diet from July 12th on. There was a slight

attack of vomiting on July 29th, which was repeated on the 30th and 31st, but was not accompanied by any intestinal disturbance or fever. Urine analysis on July 13th showed only a slight increase in indican, otherwise normal. Food was prepared at home in this case after August 3d, so that the sodium benzoate was stopped at this time.

6-30-09. Barley water, 45 ounces; milk sugar, $\frac{3}{4}$ ounce— 5×7 . Weight, 19 pounds, 3 ounces.

7-1-09. Barley water, 45 ounces— 5×9 .

7-2-09. Skimmed milk, 10 ounces; water, 35 ounces— 5×9 .

7-3-09. Skimmed milk, 15 ounces; water, 30 ounces— 5×9 . Weight, 18 pounds, 15 ounces.

7-4-09. Skimmed milk, 20 ounces; water, 25 ounces; milk sugar, $\frac{1}{2}$ ounce— 5×9 .

7-6-09. Milk, 5 ounces; skimmed milk, 15 ounces; water, 25 ounces; milk sugar, $\frac{1}{2}$ ounce; oatmeal, $\frac{1}{2}$ ounce. Weight, 18 pounds, 15 ounces.

7-8-09. Milk, 5 ounces; skimmed milk, 15 ounces; water, 25 ounces; milk sugar, $\frac{1}{4}$ ounce; oatmeal, 1 ounce; malt extract, $\frac{1}{2}$ ounce— 5×9 .

7-13-09. Weight, 18 pounds, 4 ounces.

7-15-09. Milk, 10 ounces; skimmed milk, 10 ounces; water, 25 ounces; milk sugar, $\frac{1}{2}$ ounce; malt extract, $\frac{1}{2}$ ounce; oatmeal, 1 ounce— 5×9 .

7-20-09. Weight, 19 pounds, 6 ounces.

7-27-09. Milk, 15 ounces; skimmed milk, 5 ounces; water, 25 ounces; malt extract, $\frac{1}{2}$ ounce; oatmeal, 1 ounce— 5×9 . Weight, 19 pounds, 9 ounces.

7-29-09. Barley water, 45 ounces— 5×9 .

7-30-09. Skimmed milk, 20 ounces; water, 25 ounces; oatmeal, 1 ounce— 5×9 .

8-3-09. Weight, 20 pounds, 7 ounces.

We are unable to attribute any symptom in this case to the use of sodium benzoate.

CASE VII. Baby Rosa P., aged six weeks. First seen July 1, 1909.

Father and mother alive and well; one child died at three weeks of age of some gastrointestinal disturbance. The patient was born at full term, normal delivery, weighed $8\frac{3}{4}$ pounds at birth, and was breast fed. The bowel movements were sometimes a little green and curdy, but otherwise the child was normal.

The mother was extremely nervous, the breast milk was giving out, and the child was gradually weaned until it was entirely on the bottle by July 29th.

Received in twenty-four hours the following amounts of sodium benzoate July 1st-6th, 1 grain; July 6th-16th, 1½ grains; July 16th-27th, 3 grains; July 21st-29th, 4 grains; after that, 5 grains.

Very little confidence could be put in the statement of the mother, because she was so excitable, but to all appearance the child went along all right until August 12th, with the exception of a slight nasopharyngitis, which cleared up in a few days. (Emul. Ol. Morr. 5i three times a day.)

On August 12th the mother reported an attack of vomiting and diarrhea, much flatus, and five to six green mucous bowel movements in twenty-four hours. Temperature was 99.5°F., and there was excoriation about the buttocks. This had cleared up by August 14th, when the mother ceased to take food from the diet kitchen.

6-29-09. Milk, 3 ounces; water, 2 ounces—1 x 5.

7-1-09. Milk, 6 ounces; water, 4 ounces—2 x 5. Weight, 8 pounds, 12 ounces.

7-6-09. Milk, 9 ounces; water, 6 ounces—3 x 5.

7-8-09. Weight, 9 pounds.

7-15-09. Weight, 9 pounds, 6 ounces.

7-22-09. Weight, 9 pounds, 8 ounces.

7-27-09. Milk, 12 ounces; water, 8 ounces—4 x 5. Weight, 9 pounds, 9 ounces.

7-29-09. Milk, 15 ounces; water, 10 ounces—5 x 5. Weight, 9 pounds, 13 ounces.

8-5-09. Milk, 16 ounces; water, 14 ounces—5 x 5.

8-7-09. Barley water, 35 ounces—5 x 7.

8-8-09. Skimmed milk, 15 ounces; barley water, 20 ounces—5 x 7.

8-10-09. Milk, 3 ounces; skimmed milk, 12 ounces; barley water, 20 ounces—5 x 7.

8-12-09. Milk, 6 ounces; skimmed milk, 9 ounces; barley water, 20 ounces—5 x 7. Weight, 9 pounds, 10 ounces.

8-13-09. Milk, 9 ounces; skimmed milk, 6 ounces; barley water, 20 ounces—5 x 7.

8-14-09. Milk, 11 ounces; skimmed milk, 4 ounces; barley water, 20 ounces—5 x 7.

We have here a young baby fed during the process of weaning which perforce was carried out in the middle of summer. No untoward symptoms occurred except a slight attack of vomiting and diarrhea, which cleared up almost immediately in spite of the fact that the sodium benzoate was continued.

CASE VIII. Baby Jerry R., aged fifteen months. First seen July 2d, 1909.

Father and mother alive and well. There were no other children. One miscarriage occurred about two years before. Child was born at full term, normal delivery, and was breast fed up to thirteen months, but was always given butter and things from the table. Bowels moved three to five times a day without curds or mucus. There was no vomiting. The child was brought for food from the diet kitchen, but not because he was sick.

Examination showed nothing but a rather marked rickets both of head, chest and extremities, together with palpable cervical glands.

Given Emul. Ol. Morr. 3i three times a day. Baby was fed from the diet kitchen, getting four feedings usually, sometimes five. Until July 15th he received $\frac{1}{2}$ grain sodium benzoate in a bottle, or 2 grains a day. After that 1 grain, or 4 grains a day (with the exception of July 24th, when he had 5 grains).

This child had two subsequent attacks of diarrhea—the first on August 6th. This was slight, but sufficient to retard growth. On August 24th the child had two watery stools with vomiting. Mother gave the child “catnip” tea for twenty-four hours, and then brought him to dispensary. Vomiting was very frequent. By August 26th the vomiting had ceased and, aside from a little mucus in the stool and a temperature of 100°F. , no symptoms of the attack remained. On August 28th the child was again normal and remained so until October 7, 1909.

7-2-09. Milk, 20 ounces; vegetable soup, 20 ounces; cane sugar, $\frac{1}{2}$ ounce—4 x 10. Weight, 18 pounds, 6 ounces.

7-10-09. Milk, 22 ounces; vegetable soup, 18 ounces; cane sugar, $\frac{1}{2}$ ounce—4 x 10. Weight, 18 pounds.

7-17-09. Weight, 18 pounds, 4 ounces.

7-24-09. Weight, 18 pounds, 5 ounces.

7-31-09. Weight, 18 pounds, 3 ounces.

8-7-09. Weight, 18 pounds, 4 ounces.

8-14-09. Weight, 18 pounds.

8-21-09. Weight, 18 pounds, 1 ounce.

- 8-24-09. Barley water, 50 ounces—5 x 10.
 8-25-09. Milk, 10 ounces; vegetable soup, 30 ounces—4 x 10.
 8-28-09. Weight, 18 pounds, 1 ounce; milk, 15 ounces; vegetable soup, 25 ounces—4 x 10.
 8-31-09. Milk, 20 ounces; vegetable soup, 20 ounces—4 x 10.
 9-4-09. Weight, 18 pounds, 4 ounces.
 9-11-09. Weight, 18 pounds, 9 ounces.
 10-2-09. Weight, 19 pounds, 9 ounces.
 10-7-09. Weight, 19 pounds, 2 ounces.

We have here a case of rather severe rickets in an otherwise normal baby. It was artificially fed from the diet kitchen, and in the hot weather during August developed two slight attacks of diarrhea, sufficiently severe to retard growth, but not to appreciably lower the weight. During the course of these attacks and during the baby's convalescence the sodium benzoate was continued without affecting the result in any unfavorable manner. It would seem that if the sodium benzoate were in any way to blame for the attacks its continuance in the food would at least delay, if not prevent, recovery.

CASE IX. George M., aged three months. First seen July 13, 1909.

Father and mother alive and well; no other children; no miscarriages; full term, difficult delivery; breast fed up to two weeks before entrance. Since then given barley water, "modified milk," and Horlick's malted milk. The child was taken off the breast because of a sore mouth with white spots in mouth (thrush (?)). At first (after breast) bowels moved every two to three hours, green, no curds or mucus. At the time of admission the bowels moved two to three times a day, gray in color, with curds, but no mucus or blood. The patient was extremely cross, had no fever, slept only two to three hours at a time and had lost much weight.

Examination.—Emaciated child; anterior fontanel wide open; cervical glands palpable; umbilical hernia; abdominal wall strong; no splenic enlargement. Unable to examine chest because of resistance and crying of child. Stool of greenish color with chalky curds; temperature, 99°F.; this was a severe case of marasmus with intestinal disturbance.

This child was given 1 grain of sodium benzoate to a feeding, or 5 grains per day from July 15th until death, on August 2d. Hence for only two weeks.

This child improved steadily in general condition until July 24th, when without apparent cause there was a drop in weight. The child seemed crosser and there was a great deal of flatus. On the 29th, the loss in weight still continuing, the child was placed in the hospital for better observation. On the 30th the blood showed: Red blood corpuscles, 3,920,000; hemoglobin, 70 per cent.; white blood corpuscles, 9,000. Urine negative except for five to six pus cells in a field (under low power objective).

During the stay in the hospital the temperature was 98°F. with two exceptions—one of these was August 1st, when at noon the temperature fell to 96.8°F.; the other was just before death, on August 2d, when it was 100.4°F. While in the hospital by the use of a glycerin suppository the baby had one to two stools a day, always of normal appearance. At 9 A.M. August 2d the baby became cold and cyanotic and had a few twitchings, which could hardly be called convulsions. Stimulations with normal salt, continuous enema, strychnia and brandy was given, but the child never revived, and died at 3 P.M.

7-13-09. Barley water, 20 ounces—5 x 4. Weight, 7 pounds, 11 ounces.

7-14-09. Skimmed milk, 7 ounces; barley water, 8 ounces; milk sugar, $\frac{1}{2}$ ounce—3 x 5.

7-15-09. Milk, 3 ounces; skimmed milk, 7 ounces; barley water, 16 ounces; milk sugar, 1 ounce—5 x 5.

7-16-09. Weight, 7 pounds, 14 ounces.

7-19-09. Weight, 7 pounds, 11 ounces.

7-20-09. Malt extract, $\frac{1}{2}$ ounce, was added to the food.

7-22-09. Milk, 3 ounces; skimmed milk, 7 ounces; barley water, 15 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, $\frac{1}{4}$ ounce—5 x 5.

7-24-09. Weight, 7 pounds, 4 ounces.

7-27-09. Skimmed milk, 10 ounces; barley water, 15 ounces; milk sugar, $\frac{3}{4}$ ounce; malt extract, 1 ounce—5 x 5. Weight, 7 pounds.

7-31-09. Weight, 6 pounds, 8 ounces.

8-1-09. Weight, 6 pounds, 11 ounces.

8-2-09. Barley water, 25 ounces—5 x 5. Weight, 6 pounds, 13 ounces. Death.

We have here a severe case of marasmus, showing no gastrointestinal symptoms, dying after two weeks' treatment apparently of inanition. This case is reported because there may be some

question as to the action of the sodium benzoate. However, anyone who is acquainted with these marasmic cases will realize how frequently this sudden death occurs without cause and almost without symptoms. At almost exactly the same time, and under almost exactly the same conditions of life, food, age and physical state, a child under my care died, although no sodium benzoate was added to the food. Whatever else may be said of this case no one could assert from the symptoms that the fatal ending was in any way brought about by the sodium benzoate.

The conclusion from the clinical observations is that sodium benzoate to the amount of $2\frac{1}{2}$ to 5 grains in twenty-four hours, given to artificially fed infants ranging in age from a few weeks to almost two years produces no recognizable symptoms, even though these children may be suffering from gastrointestinal disturbances of a serious nature.

EXPERIMENTS ON THE ACTION OF SUGARS IN ARTIFICIAL FEEDING.—Angiola Borrino (*Riv. di Clin. Ped.*, August, 1910) has made an extensive series of experiments as to the action of sugars of various kinds in the artificial feeding of infants. He finds that the rapid increase in weight observed on adding sugars to mixtures of milk corresponds to a lessened elimination of water by the kidneys, due to the presence in the organism of products of assimilation of the sugars absorbed. It is not possible to state whether the elimination of sugar by the lungs and skin is also diminished. The difference in the increase of weight with different sugars is due to the difference in the quantity of liquid eliminated by the kidneys; the greatest increase of weight and least elimination of water is with maltose and saccharose, and may be attributed to the easier assimilation and absorption of these sugars. Lactose is less absorbable. The other sugars cannot be as long tolerated without causing disturbances. This sugar has an important action on the intestinal movements and the prevention of putrefaction, and acts as a defence to the metabolic processes. Maltose combined with alkalies has shown itself the best sugar for administration in atrophic children. Saccharose is well tolerated by many children in methodical feeding; but lactose is the most generally applicable to artificial feeding of infants.—*American Journal of Obstetrics.*

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. T. WOOD CLARKE.

DR. C. D. MARTINETTI.

DR. CHARLES E. FARR.

DR. RICHARD M. SMITH.

DR. S. W. THURBER.

DISEASES OF EAR, NOSE AND THROAT.

SCHAEFFER, JACOB PARSONS: THE LATERAL WALL OF THE CAVUM NASI IN MAN, WITH ESPECIAL REFERENCE TO THE VARIOUS DEVELOPMENTAL STAGES. (*Annals of Otology, Rhinology and Laryngology*, June, 1911, p. 277.)

This article is one of 88 pages and too comprehensive for abstraction. It should be read in the original and is very instructive to those especially interested in rhinology.

S. W. THURBER.

YANKAUER, SIDNEY: FOUR CASES OF FOREIGN BODY IN THE ESOPHAGUS REMOVED WITH THE AID OF THE ESOPHAGOSCOPE. (*Annals of Otology, Rhinology and Laryngology*, June, 1911, p. 414.)

CASE I. Child of three who had swallowed a penny one week before being seen. The fluoroscope showed the shadow just above the sternal notch. The penny was removed without an anesthetic and shows how inoffensive a relatively large body may be at times.

CASE II. Child of fourteen months having swallowed a metallic toy rooster. The fluoroscopic shadow showed at the sternal notch and the toy was removed under ether anesthesia with very little trouble. It measured 6 x 15 x 21 mm., with pointed ends and projections which would have occasioned serious consequences unless promptly removed.

CASE III. Boy of two and one-half, having swallowed a penny, was taken to a physician, who could feel the coin with his finger and could grasp it with forceps, but it offered so much resistance that he thought best not to use extreme traction without an esophageal examination. With the esophagoscope the coin was readily removed with no resistance, but a small abrasion of the mucous membrane was seen above where the forceps had evidently grasped membrane and coin and which explained the

resistance offered at the first attempt at removal. No untoward symptoms followed.

CASE IV. Boy of four, who had swallowed a piece of brass the shape of a truncated cone, 8 mm. high and of a diameter of 6 mm. at one end and 17 mm. at the larger end. A radiogram showed the body just above the sternal notch. The child could swallow with difficulty and his temperature was 100°F. Two esophagoscopic examinations made within two days showed the passage obstructed by a whitish mass which hid the piece of brass. This proved to be an extensive wound in the posterior wall of the esophagus through which the instrument entered a fistulous tract and it was also determined that a wound existed running across the esophagus and down the right side for a distance. This made a flap over which it was very difficult to introduce the esophagoscope. When the larynx was drawn forward a spasm was caused which made it necessary to resort to artificial respiration. Finally, by keeping close to the back of the tongue, the instrument was introduced and the body withdrawn. The patient could not swallow after he rallied from the operation and had to be fed per rectum, but he died the third day thereafter.

S. W. THURBER.

YANKAUER, SIDNEY: TWO CASES OF FOREIGN BODY IN THE BRONCHUS; A CASE OF TUMOR IN THE LOWER TRACHEA; REMOVAL BY UPPER BRONCHOSCOPY. (*Annals of Otology, Rhinology and Laryngology*, June, 1911, p. 418.)

CASE I. Boy of four, who had swallowed a pin a few days previously. He was coughing and vomiting, with a temperature of 101.6°F., pulse 150 and respiration 36. A radiogram showed the pin on the right side between the second rib and the fourth intercostal space. It was successfully removed after being bent upon itself and was 1½ inches long, with a glass head ¼ inch in diameter.

CASE II. Girl of twelve, who swallowed a prune stone "the wrong way" eight months ago. She had a severe coughing spasm and continued to cough for three days, but as the X-ray plate showed nothing and the cough subsided she was discharged from the hospital. The cough soon returned and she went to another hospital, where an X-ray plate proved negative, as did a bronchoscopic examination. The cough returned again and she came into the Roosevelt Hospital. A third X-ray plate showed

a faint shadow in the region of the left bronchus. Considerable difficulty was experienced in locating the opening of the left bronchus, which proved to be swollen and edematous, so that the orifice was hidden. When the instrument was finally advanced $1\frac{1}{2}$ cm. past this obstruction the lumen of the bronchus came into view and the prune stone was readily removed with the tube, it being too large to be drawn out through it. A prompt recovery resulted.

CASE III. A child of three, who had had a spasmodic cough for eight months, gradually increasing in severity. A cauliflower growth was found just above the opening of the left bronchus and occupying about two-thirds the lumen of the trachea. It was removed piecemeal with forceps with very little bleeding. A gradual recovery took place, but the exact nature of the growth could not be determined by the microscope. S. W. THURBER.

SURGERY.

MARIMON, J.: SUBCUTANEOUS SILK DRAIN IN TREATMENT OF HYDROCEPHALUS (NEUE METHODE DER CHIRURGISCHEN BEHANDLUNG DER HYDROCEPHALIE). (*Zentralb. für Chirurg.*, Leipsic, August, 1911.)

Marimon succeeded in relieving a hydrocephalus by forcing a silk drain from the lateral ventricle into the parotid gland of the same side. The technic is similar to that of Handley's method for elephantiasis, and is very simple. With a long curved needle threaded with heavy silk, the ventricle is pierced and the needle brought out through the skin at the side of the head. By reinserting the needle at the point of exit the silk is made to pass subcutaneously as far as the parotid and is then cut off and allowed to drop in. In Marimon's case there was very marked improvement, but the child died of an intercurrent affection five weeks later. The simplicity of the operation and its freedom from shock are strong points in its favor. CHARLES E. FARR.

BODKIN, MARTIN L.: PROLAPSE OF THE RECTUM IN CHILDREN. (*Medical Review of Reviews*, August, 1911.)

After carefully defining the various degrees of prolapsus recti and of rectal hernia, the author takes up the diagnosis and treatment. The most important treatment, of course, is prophylaxis,

keeping up the child's general condition and avoiding constipation and diarrhea, phimosis, or any other cause of straining. Simple methods of treatment are given in detail and the various forms of surgical operation, by cautery, etc. Of the greatest importance is the after treatment, which looks to the retention of the prolapse until union and cicatrization have taken place. For the more serious condition of sigmoid prolapse a laparotomy is necessary, with suspension and fixation of the intestine to the abdominal wall.

CHARLES E. FARR.

CLOGG, H. S.: SURGICAL ASPECTS OF ACUTE ABDOMINAL DISEASE IN CHILDHOOD. (*British Journal of Children's Diseases*, London, August, 1911.)

The author, summarizing 98 acute abdominal cases in children under twelve, found 54 cases of appendicitis, 6 of pneumococcal peritonitis, 2 cases of Meckel's diverticulum, 28 of intussusception; obstruction by a band, 3 cases; by adhesions, 4 cases; by mesenteric gland, 1 case. There were no gastric or duodenal ulcers. This is certainly a much larger percentage of intussusception than we are accustomed to find in this country.

CHARLES E. FARR.

GUISEZ, G.: ESOPHAGOSCOPY IN DIAGNOSIS AND TREATMENT OF CICATRICIAL STENOSIS. (*Bull. de la Soc. de Péd.*, Paris, June, 1911.)

Guisez has found esophagoscopy in children comparatively easy, as the mouth of the esophagus opens rhythmically with inspiration. Twenty-one of his 54 patients with cicatricial stenosis of severe grade were children, and all but 2 have been practically cured by local treatment, by bougies or circular electrolysis applied through the esophagoscope.

CHARLES E. FARR.

SAVARIAUD, M.: TREATMENT OF CLUB-FOOT IN INFANTS BY SUBCUTANEOUS PARTIAL SCOOPING OUT OF THE TARSUS (TRAITEMENT DU PIED-BOT CHEZ LE NOURRISSON PAR EVIDEMENT SOUS-CUTANÉ DU TARSE). (*Bull. de la Soc. de Péd.*, Paris, June, 1911.)

Savariaud uses his subcutaneous operation even in infants when forcible correction and manipulations are unavailing. He aims to curet out the head of the astragalus and the greater process of the calcaneus, avoiding the ossification center and re-

moving most of the cartilage. When easy hypercorrection is obtained the skin is sutured and a plaster casing applied for several months. The necessary tenotomies were done before curetting. The end results are perfect, the children being able to wear ordinary shoes and having remarkably supple feet. Preceding the operation manipulations may be of great help in lessening the extent of bone removal. The author has operated on cases as young as six months with excellent results. CHARLES E. FARR.

GRUBER, G. B.: PEPTIC ULCER IN STOMACH, ESOPHAGUS AND DUODENUM. (*Münch. med. Woch.*, August, 1911.)

Gruber, in a series of reports of peptic ulcer, found post-mortem, mentioned the fact that 17 were in children under ten, and 4 between the ages of ten and twenty, making a total of 21 out of 170 cases found in the entire series of 4,208 necropsies. In view of the great rarity of the clinical diagnosis of peptic ulcer in children these statistics are certainly very suggestive and should lead to a more careful study of the gastrointestinal symptoms of childhood. CHARLES E. FARR.

MEDICINE.

POYNTON, F. J.: COMPLICATIONS OF RHEUMATISM IN CHILDHOOD. (*British Medical Journal*, August 5, 1911, p. 253.)

The author discusses some of the common complications of rheumatism, mentioning, in the first place, the frequent occurrence of pleurisy, especially in cases which show affection of the heart. The pleurisy rarely gives rise to an exudate sufficient in amount to need paracentesis. Bronchopneumonia also frequently occurs. It is apt to give rise to signs which point to a consolidation more extensive than is actually the case, probably due to the associated pulmonary collapse around the pneumonic area. Acute pulmonary edema sometimes occurs entirely independently from the passive congestion that is so often met with in advanced cardiac conditions. It is rapid, often beginning at the apices, not at the bases of the lungs, and is frequently fatal. Peritonitis rarely occurs, and if present is usually localized in the upper region of the abdomen. Frequently, also, infection of the muscles, subcutaneous tissue and fasciæ occur. RICHARD M. SMITH.

ROASENDA, L. C.: POLIOMYELITIS AND POLIENCEPHALITIS. (*Gaz. degli Osped.*, No. 88.)

Symptoms of poliomyelitis and poliencephalitis frequently appear simultaneously. Rossi proved this by autopsies. The toxin exerts its action together on the central and peripheric neurons. In one case particularly Roasenda found poliomyelitis on the right side and poliencephalitis on the left. The child was two and a half years of age.

In sciatic monolateral neuritis the author found no difference in the temperature of the limbs, while in the case of monoplegic affection following poliomyelitis he found normal temperature on the healthy side and elevation on the affected.

C. D. MARTINETTI.

HUME, WM. E.: GENERAL EDEMA FOLLOWING GASTRO-ENTERITIS IN CHILDREN. (*British Medical Journal*, September 2, 1911, p. 478.)

The author reports a study of 9 cases of general or localized edema in infants following attacks of diarrhea or vomiting. From a postmortem examination of 2 cases in which there were lesions in the medulla of the adrenals, he suggests that possibly these lesions may be the cause of the edema. The lesions consist in large masses of fibroid tissue, apparently beginning in, and spreading out from, the cells of the blood capillaries. Many of these localized masses are linked by strands of fibrous tissue so that a core of fibrous tissue appears to run through the gland. There seems to be an absence of the cells of the medulla. In support of this belief he cites the improvement which followed in all of his 9 cases after the administration of adrenalin chlorid subcutaneously. He conducted experiments on several cases with a view to determining the relationship of sodium chlorid and phosphate retention to the edema. He found that enormous quantities of salt are required to affect appreciably either the curve of salt retention or the body weight, and he failed to discover that there was any difference between the salt exchange in cases suffering from this variety of edema and that which takes place in perfectly normal children. He suggests the hypothesis that toxins are developed in the gastrointestinal tract which cause degeneration and fibrosis of the suprarenal medulla, and that either as the result of the absence of suprarenal secretion or from the direct

action of the toxins upon the capillary masses the latter become more pervious to the outlet of fluid. RICHARD M. SMITH.

FIFE, CHAS. F., AND VEEDER, BORDEN S.: STUDIES IN THE METABOLISM OF ATROPHIC INFANTS. (*American Journal of Diseases of Children*, 1911, Vol. II., No. 1, p. 19.)

The authors conducted extensive metabolism experiments on 2 atrophic infants and found that the fat absorption was less in these infants than in normal infants, but that they were able to absorb large quantities of fat. The percentage of fat absorbed was larger with a large amount of fat in the diet than with small amounts. The fat absorption was not influenced by the amount of carbohydrate in the food. The amount of soaps in the stools was greater when the fat intake was low and was not proportional to the amount of calcium in the feces nor to the amount of carbohydrate in the food. The nitrogen retention was greater than in normal infants. It was not influenced by the amount of fat in the food and was increased by increasing the amount of carbohydrate in the food. RICHARD M. SMITH.

COOMS, C. F.: THE NATURE AND TREATMENT OF CHOREA. (*The Medical Press and Circular*, June 7, 1911, p. 597.)

Sydenham's chorea is of rheumatic origin. Of 227 cases studied, 172 gave definite history or evidence of rheumatic infection. Evidence of the rheumatic nature of the disease is found in its almost invariable association with other manifestations of the rheumatic infection and in its characteristic rheumatic course a series of active attacks separated by incomplete recoveries. Post-mortem changes were studied in 4 cases of chorea. The special cells of the central nervous system showed marked degenerative changes. These vary from the earliest stages of chromatolysis to absolute destruction of the internal cellular detail. The cortical cells suffered most severely, all parts of the cortex, both motor and other areas, being equally affected. Slight chromatolysis was noted in the motor nuclei of the pons and medulla, but the anterior cornual cells of the cervical cord showed no abnormality. The cerebellum was not diseased. In these cases no meningeal changes were noted. These changes suggest cerebral intoxication without microbic invasion. The incoördinated movements suggest a combination of reduced inhibitive power and cortical irritation. The symptoms of chorea are (a) psychical, including ir-

ritability, emotionalism, slowed cerebration; (b) cranial, including pupillary changes; (c) motor, loss of inhibition, involuntary irritative movements and paresis; (d) sensory, paresthesias, anesthesias and hyperesthesias; (e) coördination; (f) reflexes, increased or "hung-up." The treatment should include (1) salicylates in moderate doses, not so much to stop the movements already occurring as to prevent further progress of the disease; (2) rest in bed until active symptoms have ceased; (3) improvement in general health by country life; and (4) symptomatic. If the movements are not excessive, no quieting drug should be used. If they are excessive, chloreton, 4 to 8 grains three times a day. Hot packs will also at times quiet excessive restlessness.

T. WOOD CLARKE.

O'MEARA, T. J.: HEREDITARY PROTECTION AGAINST THE TOXEMIA OF MEASLES. (*Medical Press and Circular*, September 6, 1911, p. 248.)

Measles is an ailment of childhood essentially because most susceptible individuals are infected during early life and are immune as a result during adult life. It is a mild disease, because immunity to the toxemia is hereditary. Where the disease is introduced for the first time it attacks adults and is often fatal. In 1875, in an epidemic in the Fiji Islands, 40,000 of the 150,000 inhabitants died of measles. There have been several epidemics in the Island of Cape Clear, Ireland. In 1844 28 were attacked and 7 died. In 1866 20 were attacked and 4 died. The parents of none of these cases had had measles. An analysis of the cases in the various epidemics since shows a steady decrease in the mortality among patients whose parents had had measles previously. From 1904 to 1910 there have been 41 cases with no deaths. During these sixty-seven years the severity of the symptoms of measles has decreased, due to an inherited immunity, not to the infection, but to the toxemia of measles. T. WOOD CLARKE.

NEUSTAEDTER, M. AND THRO, W. C.: EXPERIMENTAL POLIO-MYELITIS. (*New York Medical Journal*, September 23, 1911, p. 613.)

Experiments were made in collecting the dust from rooms which had harbored acute cases of poliomyelitis. The sweepings were shaken for some hours with salt solution passed through a Berkfeld filter and injected into monkeys. In Case IV. the clear

solution was injected into the ventricle. Seven days later the monkey became paralyzed. Monkey No. 5 was injected subcutaneously with a similar extract from another room. He became paralyzed six days later. At autopsy the spinal cord showed the pathologic changes of poliomyelitis. Emulsion of the cord of the killed monkey produced poliomyelitis in a well monkey. By these experiments, it is proven that (1) acute poliomyelitis is both infective and contagious; (2) it is propagated by dust, and (3) the nasopharynx must be the port of entry.

T. WOOD CLARKE.

SCHUKOWSKY, W. P.: STRIDOR LARYNGEUS (INSPIRATORIUS) CONGENITUS. (*St. Petersburg Med. Woch.*, December 11, 1910, p. 697.)

Congenital laryngeal stridor is a condition of which the knowledge is comparatively recent. It is often mistaken for laryngospasm of spasmophilia. A review of the literature shows two more classes of theories as to etiology—nervous and mechanical. Three cases are reported. One of these was of a child, which died on the seventh day of life. The thymus was slightly enlarged, but caused no constriction of the trachea. The edges of the epiglottis were thickened and were dotted with small erosions and exudation, which proved to be composed of inflammatory infiltration with superficial ulceration. Similar exudation occurred on the tongue and tonsils. There was a possibility of a specific inheritance, but no signs of syphilis were found. In another case the stridor was associated with microglossia and split palate and was due to the falling back of the tongue.

T. WOOD CLARKE.

THERAPEUTICS.

CUMBERLEGE, G. I.: THE ADMINISTRATION OF SERUM BY MOUTH. (*British Medical Journal*, July 15, 1911, p. 108.)

The author advocates the giving of diphtheritic antitoxin by mouth, and states the following advantages of this method over subcutaneous administration. It is equally efficacious, results appearing within a few hours after it has been given; a smaller dose is required; the pain caused by, and the fear of, the needle, which involves a certain amount of risk because of the strain upon the heart, is avoided; it is possible to give continued doses

every two to four hours; no cases of serum sickness have been observed. He cites also several cases showing the beneficial results of antitoxin administered this way.

RICHARD M. SMITH.

ROTCH, THOS. MORGAN, AND KENDALL, A. I.: A PREPARATORY STUDY OF THE BACILLUS ACIDOPHILUS IN REGARD TO ITS POSSIBLE THERAPEUTIC USE. (*American Journal of Diseases of Children*, Vol. II., No. I, p. 30.)

The authors discuss, first, the biology of the bacillus acidophilus as compared with bacillus bulgaricus. The former organism acts most favorably below the ileocecal valve, while the former acts above the ileocecal valve. Bacillus acidophilus produces lactic acid in the presence of a carbohydrate diet, and this changes the metabolism of the bacillus coli from a proteolytic to a fermentative type of organism and reduces the number of streptococci in the stools. Thus in cases in which bacillus coli and the streptococcus are present in large numbers, as in cases of bacillary dysentery, the beneficial therapeutic action of bacillus acidophilus is brought about by rendering the medium in which they are growing unsuited for their continued development, thus reducing the amount of toxin which is produced. By the introduction into the intestinal tract of bacillus acidophilus it is possible to change the character of the bacterial flora from the putrefactive type to the fermentative type, that is, to the type of bacteria found in the stools of normal nurslings. Bacillus acidophilus is chosen in preference to bacillus bulgaricus in cases in which it is particularly desired to influence intestinal flora beyond the ileocecal valve. Two cases are cited to show the changes actually produced by the addition to the food of an excess of carbohydrates. Thus far the work has been carried on only to a limited extent, but further studies are in progress to determine the actual therapeutic value of the procedure.

RICHARD M. SMITH.

INFANT FEEDING.

HOOBLER, B. RAYMOND: THE RÔLE OF MINERAL SALTS IN THE METABOLISM OF INFANTS. (*American Journal of Children's Diseases*, 1911, Vol. II., p. 105.)

The author gives a careful analysis of the occurrence of the various salts in the body tissues during the different periods of

life and the salt content of cow's and mother's milk. He discusses in detail the part played by potassium sodium, calcium magnesium, iron, phosphorus and sulphur in metabolism and their method of absorption, retention and elimination. He concludes that salts are necessary to maintain life; that they are best absorbed and utilized when in organic combination with foodstuffs. The failure to absorb certain of the salts, even though they may be present in sufficient amounts in the food, may lead to pathologic conditions. The withdrawal of salts from the body which occurs in certain diseased states may so reduce the salt content as to produce serious disturbances of nutrition. The different salt content of mother's milk and cow's milk should be borne in mind in artificial feeding of infants. Iron is the only salt not present in mother's milk in sufficient quantities and in proper proportions. In diluted cow's milk there is usually an excess of salts, and this excess is particularly important to bear in mind in connection with infants already suffering from disturbances of nutrition. The methods of changing the salt content of feedings and the indications for such changes are as yet unsolved problems.

RICHARD M. SMITH.

BOOK REVIEWS.

THE CARE OF THE BABY: A MANUAL FOR MOTHERS AND NURSES. Containing Directions for the Management of Infancy and Childhood in Health and in Disease. By J. P. CROZER GRIFFITH, M.D., Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania. Fifth edition, thoroughly revised. Philadelphia and London: W. B. Saunders Company, 1911.

The appearance of a fifth revised edition of this classic work, which has gone through several revisions and many reprintings since it first appeared in 1895, is enough to indicate its character and rank without any comments on its contents. If any criticism is to be admitted it would probably be to question whether the book has not grown to be too unwieldy for the average mother with the average lay mind, and whether some of the information which verges upon the medical might not better be replaced by an admonition to consult the child's physician whenever the mother is in doubt. This plan usually results in less meddling and fewer long delays.

ARCHIVES OF PEDIATRICS

NOVEMBER, 1911.

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

EXPERIMENTAL EXANTHEMATA.

Although the bacillus which Dr. Nicoll found in his attempts to duplicate the work of Dr. Vipond was not the identical bacillus which the latter found in his aspirations of the glands of children suffering from scarlet fever and which he regards as the specific cause of the disease, yet in view of the fact that the origin of Dr. Nicoll's bacillus in the asbestos packing of his aspirating syringe was definitely determined, and none of his later cases aspirated after complete sterilization and re-

sterilization of his syringes had been carried out gave any organisms at all, it seems probable that Dr. Vipond's bacillus was also a contamination. This is the more certain because of the results of culture of glands excised from scarlet fever cases by Dr. Nicoll, these being quite negative; and also because of the work of Dr. Kolmer, who obtained negative cultures from material aspirated from glands and from the excised glands. Had one observer failed to obtain Dr. Vipond's results it would not necessarily have shaken our belief in the probable reality of his work, because technical errors might have been alleged. But to have an observer working in so unimpeachable a laboratory as Dr. Park's, find in 6 successive cases of scarlet fever a bacillus which, although ultimately proved to be different culturally from that obtained in Montreal, was yet so like it at first as to seem the same, then locate it as a contamination of the asbestos packing and then sterilize the syringes so that Dr. Vipond himself could not get a growth, puts a period to our suspended judgments in the matter. The incident has been of value inasmuch as it has pointed out the necessity for utter completeness of sterilization in such cases and the difficulty of doing it sometimes.

As to the appearance of the rash, coated tongue, desquamation, etc., we cannot speak so positively. In Dr. Nicoll's cases no exanthem was noted except the dermatitis due to shaving rabbits. Granting that Dr. Vipond was not carried away by his enthusiasm, his obtaining the rashes may be explained perhaps upon the supposition that in the aspirated fluid was the virus of scarlet fever as well as the "bacillus of scarlet fever," and this, surviving unrecognized in the cultures, was injected and caused a scarlet fever in the monkeys. This, as Dr. Vipond reported, was also conveyed by contact. However it may be, and it is not so improbable in view of the growing tendency to regard the virus as a filterable virus, yet, with our present data, the case must rest here.

On the other hand, measles may be induced in the monkey. Anderson and Goldberger have recently reported some very in-

teresting work in this subject.* In a fair proportion of cases they obtained by blood inoculations sufficiently definite reactions to justify their regarding the monkey as susceptible to measles. They obtained fever, very definite maculo-papular eruption, and occasionally sneezing and coughing. They have determined that by inoculations of blood from patients suffering from the disease measles can be transmitted to the monkey provided that the blood be drawn not too long after the beginning of the rash, in their experiments, something between 65 and 113 hours being the longest time possible. Such infections have been transmitted by blood inoculations from monkey to monkey through six generations without any determinable loss in virulence. Transmissibility by contact has also been demonstrated in more than one case. Anderson and Goldberger also, investigating the infectivity of the nasal and buccal secretions in measles, have determined that they are infective certainly at the beginning of the eruption, that is the fourth day, and as late as the sixth day of the disease.

These authors have not added anything to our knowledge of the identity of the virus of the disease, except in so far as they have shown that it did not cause a visible growth when the blood from human or animal cases, itself infectious when inoculated into animals, was inoculated into glucose broth. We may hope for more work along this line from these authors in the near future.

We now need some new means to detect these infinitesimally small and filterable viruses of poliomyelitis, measles and scarlet fever, if that be one. We have the faith to believe that if only the human eye will be equal to the task, some mechanical means will be devised.

* Reprint from Public Health Reports, No. 62. J. A. M. A. July 8 and August 5, 1911.

ORIGINAL COMMUNICATIONS.

FUNCTIONS OF A STATE PEDIATRIC SOCIETY.*

BY HENRY L. COIT, M.D.,

Newark, N. J.

The New Jersey State Pediatric Society, the first organization with its specific purposes, was conceived by physicians and at first limited its membership to those who were engaged in medical work among children.

Like other pediatric societies, it had for some of its objects clinical study, efficiency in pediatric practice, improvement in hospital methods, and also to popularize a knowledge of child hygiene.

Soon after its organization, the projectors of this society realized that the experience and knowledge growing out of medical investigations alone were not sufficient to solve many of the problems of child life presented to such a society, and a plan was adopted looking toward a broader and more comprehensive scope for the society's work.

The "efficiency engineers" of childhood are not all engaged in the practice of medicine. They are found in bureaus for the study of economics, in laboratories working out epidemiologic problems, in institutes endowed for investigation, in the practical field of philanthropy where sociologic questions are being answered, on the forum, in the pulpit, in the school, and in the home, where opportunities for gaining accurate knowledge concerning child life are scientific and conclusive.

It seems wiser in the organization of a State Pediatric Society, with a membership drawn from a commonwealth, to unite for concerted work several classes of persons who have had special opportunities for studying child life in their respective fields.

To study any subject from a single standpoint results in a narrow and warped opinion, but if influenced by the knowledge and experience of many workers, it prevents the refractory effects of such a limited perspective.

Therefore, a society seeking truth concerning the vital inter-

* Presidential address delivered at the Second Annual Meeting of the New Jersey State Pediatric Society, Spring Lake, N. J., June 12, 1911.

ests of the children of its own State should include in its membership not only the physician but also the psychologist, the social worker, the municipal or State officer, the economist, the statistician, the school teacher, the educational expert and the parent. In fact, "any qualified person who is engaged in the study of childhood or in teaching subjects relating to the welfare of children or engaged in investigations relating to the economic problems of child life."

There is no feature of our time more evident than that of conference, coöperation and combined effort for economy and efficiency. If this society exercises wisdom and, with added experience, mature judgment in administering its affairs, it will mark the beginning of a movement for the development of many other such societies.

The plan of the society includes the following objects:

First, to unite the physicians, teachers and others in the State who are engaged in the scientific study of infancy and childhood.

Second, to promote, by its concerted efforts, scientific research in the department of pediatrics and in any field of child conservation.

Third, to foster a general interest in pediatrics by physicians and to extend the knowledge of approved methods used for the welfare of children.

Fourth, to study the problems of infant mortality and to popularize a knowledge of infant hygiene and of the means for the protection of child life.

Functions are never properly performed without organic integrity. This is as true of a society as it is of the human body. Organic integrity is the mechanical equipment for functional efficiency. With organic completeness the society has the machinery necessary for efficient functional activity and ought to fulfil the mission for which it was brought into existence.

The general public and the general practitioner of medicine are sorely in need of advanced knowledge of child life. The dissemination of such knowledge so that these two classes may utilize truth for the benefit of all is a fundamental function of this organization. A larger duty is to encourage all movements and to direct some of them for the protection of children, whether it be in medical research, clinical work, preventive medicine, practical therapeutics, child psychology, child hygiene, management and parental care or in the training of the mind in the school.

Pediatrics is a special branch of the general science of human life devoted to the interests of a special class, the most helpless and appealing of all, and it includes many kinds of inquiry into normal and abnormal child life.

All great movements for the benefit of mankind are altruistic as well as economic, so that any correct survey of the work for the uplift of children must be influenced and characterized by our love for children. Our initial motive should be humanitarian, born of a desire to alleviate suffering. When this thought is given its proper place in the field of scientific investigation, it will dignify the labor and justify its designation as scientific altruism.

There are a great many existing conditions inimical to child life. These often represent forces which supplement one another, like the causes of malnutrition, following the antecedent feeder of these causes—commercial greed. These forces are sometimes destructive to a healthy mind and often negative a carefully-conducted programme, as when the normal child's mind is poisoned by error and sophistry.

It seems to me that the following would fairly well define the conditions which urgently call for study and improvement:—

First, defective types of temperament in parents, caretakers and teachers of children.

Second, defective management and care so universal in the period of infancy and in the irregular and inefficient government during childhood.

Third, defects of development, congenital and acquired.

Fourth, medical inefficiency, parental ignorance and poverty.

Fifth, defective hospital, institutional and home environment.

Sixth, inadequate moral training.

Seventh, defective educational methods in the home and in the school.

Eighth, the prevalent injurious waste of energy which retards normal physical development.

Ninth, injurious feeding, so common during infancy and childhood.

To me it has been helpful to a better understanding of childhood to divide it into distinct stages. For a comprehensive study we may consider that development extends from birth to the attainment of full grown physical integrity which is beyond the legal age. This may be divided into seven periods, which I am fond of regarding as the seven ages of childhood.

First, the period of absorption and physical dependence when, during the first year, the infant is wholly helpless, recumbent and dependent upon its mother.

Second, the period of organic and functional integrity when, during its second year, the child becomes an omnivorous animal and by walking acquires physical independence.

Third, the period of physical evolution and functional activity when, between the third and fifth years, the child unfolds rapidly, especially in its physical powers.

Fourth, the period of the more rapid mental development when, between five and seven, there is an automatic and perpetual effort to absorb knowledge with a mental adaptation to the environment. The period of "play let's pretend."

Fifth, the period of ripening of the senses, of activity of the memory, of mental and physical fixation when at seven, the proper school age, the capacity for mental tasks is acquired and until fourteen, the high-school age, the time is employed in securing the groundwork of an education. This is also the period of puberty.

Sixth, the period of adolescence when, between fourteen and twenty-one years, the child is exuberant, ambitious with a future outlook and with proper guidance marshals its mental and physical powers during its rapid physical growth.

Seventh, the period with individual variations of transition from the end of adolescence to full physical vigor and perfection. The period of the beginning of service when human obligations are realized and undertaken and when permanent relationships are established with a recognition of the responsibilities growing out of them.

With these divisions in our mind it is easy to determine what fields need cultivation, in what period reforms should be instituted, and by applying to each the analysis of defects outlined in a foregoing paragraph we may comprehend the magnitude of the task before us.

Let us take the two periods represented by the first and second years. The more than a quarter of a million infants who perished in the United States last year fixes a responsibility upon us for the safety of the millions who remain. There is no civic duty of more vital importance or obligation upon society more urgent than the rescue from suffering and impending death of

infants who are in danger through parental and professional ignorance of the means for their safety.

The most important part of a building is its foundation. In this case the foundation is laid in the first two years. When, at the end of these fundamental periods, there is physical independence there should also be organic and functional integrity.

This will be conditioned largely upon normal nutrition. Therefore, it seems to me that we should take it upon our hearts as a duty to encourage and, where possible, to urge the nursing of infants by their mothers and repeat the work that is being done in many centers by the establishment of consultations for nursing mothers.

The third and fourth periods, marked by functional activity and adaptation to environment, entail a most important duty to insure to the child a healthful physical, mental and moral atmosphere. After the bodily health has been safeguarded, the parent or nurse constitutes this atmosphere, and upon the temperamental type of the caretaker depends very largely the normal or abnormal child. Our efforts should be directed to the elimination of the neurotic, incompetent, thoughtless and indulgent type of nurse and to the protection of little children of all classes from inefficient and ignorant parents.

The fifth and sixth periods present many problems. None are more important than the separation of the mentally and physically fit from the unfit. This will impose a heavy tax upon our resources for the benefit of a large and increasing class, namely, the feeble-minded and epileptic children. While it is not our function to determine methods for their care and treatment, we should assist in securing legislation which will conserve the interests of these unfortunates and also protect the public from the results of neglecting them.

We may be proud of such institutions as those at Vineland and at Skillman in our own State. With the efficient management in these colonies we should see that they lack nothing to make their work scientific and efficient. The legislative appropriation of \$21,000 in 1910 was a timely provision for greatly needed additions to their facilities and will add to their effectiveness and the reputation of our state.

Already correspondence between the institutions caring for feeble-minded children and their insane parents is being es-

established in order to discover the truth concerning the relations of the factors causing insanity and feeble-mindedness.

The action of our Legislature in making appropriations for research along these lines is commendable and should be continued. The state hospital at Trenton has received an appropriation of \$4,800 for research work. This is a long stride in the right direction, but it is not adequate.

The passage of the bill known as the Sterilization Act is a direct result of investigations thus made possible. This measure is quite satisfactory, with its provision for a commission of two physicians, together with the medical superintendent of the institution and the commissioner of charities and correction. Further legislation is needed. Some provision should be made to protect society from idiotic girls as well as from boys to make a law effective. It is a matter for pride that New Jersey stands first in the United States in its passage of such a radical reformatory measure.

As in the field of physical deficiency, so in that of moral delinquency and degeneracy, the coöperation of our Society should be assured to the New Jersey Reformatory for Boys and to the State Home for Girls. Moral defectives become moral dissolutes with freedom, and while they cannot be kept from marriage they can be made harmless by a humane and beneficent surgical procedure which will effectually prevent the propagation of their kind.

Economic and social problems should claim a large share of our attention. One of the most effective means for gathering data as a basis for such investigations is to send field workers out from hospitals, consultations and children's institutions to obtain the facts concerning the causes of defectives, dependents, sickness, suffering and mortality. This is the only way we can determine intelligent treatment and formulate effective plans for prevention.

A hospital's responsibility does not begin with its admission of patients to its wards or with their discharge at the end of service. A hospital staff has exceptional opportunities to form mature judgments on social conditions of the poor, and to exercise supervision over follow-up work either for gathering statistics or for giving instruction to prevent distress, sickness and death.

A prominent social worker, criticising expensive hospital ad-

ministration, recently asked, "Has private philanthropy the right to substitute treatment for education?" This is an unwarranted attitude toward the life-saving work of hospitals where disease is treated and cured. Philanthropy must do both. It must treat sickness and then try to prevent its recurrence. It is by saving the 5 per cent. in hospitals that we learn how to help or save the other 95 per cent. by educational methods. Aside from its humanitarian features, the treatment of 5 per cent. in hospitals is a very large and necessary economic factor. It would be wrong to say to a woman whose baby was sick enough to die, "I cannot divert my attention to saving the life of this baby, I must educate you."

A large percentage of mothers cannot be educated. We have to do everything for them—hospital care, nursing, the preparation of food and its subsequent protection. Cure and prevention are inseparable. Medical philanthropy must not be discredited or discounted in the eyes of the enthusiastic educationalist.

Education as applied to the reduction of infant mortality is a new necessity. It has become more necessary during the last thirty years because the mothers of the last generation were physically more competent and capable than are those of the present day. This is the fault of our social system, which imposes a greater nervous strain upon parents. It is the fault of methods applied to the training of children in our homes and of the present-day school curriculum which overtaxes the mental powers and fails to prepare the child for parenthood or the girl for motherhood.

Another important field for our work is the protection of children who are made use of very early in life for the family support. This is not always done to satisfy the mercenary and selfish parent, but often by the complicated situation of necessity. A father dies and the mother, with six children under twelve years of age, faces want and hunger, and while the father's support kept the children over seven at school now the neighbors say to the mother, "Put your older children at some legal toil and do not become a slave yourself." Most of these women make sacrifices for their children and would fain give them an opportunity for an education.

It would not pauperize this class to render a little financial assistance and supplement what the mother can earn with needle and hard industry after the children are tucked in bed. The mid-

night oil would be spent with a cheerful heart if she had the extra two or three dollars per week to enable her to keep the children in school. It would be a legitimate function of our Society to see that State funds are appropriated for this purpose and wisely administered. The working child is a reproach to human society and wise child labor laws should be enacted and made effective.

The public school offers many problems yet unsolved, and without the coöperation and the special knowledge of the physician and professional sanitarian the school authorities are unable to solve them. It seems to me that one of the most uncultivated fields in pediatrics is the public school, and this notwithstanding the fact that we have in the United States the best school system in the world.

Perfection in a school system would consist largely in plans for the mental training and development of the child, but always with a proper consideration of its physical well-being. This can only be accomplished by the harmonious coöperation of school authorities with physicians who have experience enough in these matters to exercise mature judgment.

There live in the United States 20,000,000 of school children. They are committed to the care of parents and then of school teachers during the formative period of their lives, which means about twelve years. In the aggregate the care of 20,000,000 of bodies and minds for twelve years entails a grave responsibility and should impress us with the high privilege and the higher duty of conserving these unfolding bodies with their receptive and susceptible minds.

Our duty as physicians, sanitarians, teachers and parents, as respects our school children, is to see that education is so judiciously planned that it will not interfere with the health. The foundation of all permanency in human life is a healthy body, and the maximum of efficiency in the individual will depend upon a digestion which knows no defect, an unimpaired nutrition which will insure organic completeness, with sound bone, strong muscles and a brain and nervous system capable of normal impulses.

Success in adult life will be best attained if the bodily powers are conserved during the developmental period of childhood. Education should be regarded as an endowment intended to supplement, but not to impair, the child's native mental and physical faculties.

A STUDY OF THE PARATHYROID GLANDS, WITH ESPECIAL REFERENCE TO INFANTILE TETANY.

BY RAYMOND W. BLISS, M.D.,

Belmont, Mass.

The laboratory work covered by this article was done in the pathologic laboratory of the University of Breslau, Germany, during the months of October, November and December, 1910, at the suggestion of Professor von Pirquet, director of the Universitäts Kinderklinik in Breslau.

It is generally admitted now that the parathyroid glands are organs with a distinctive function and that their presence in the human body is essential to life. Experimental evidence has shown that death from acute tetany is produced by the complete removal of these glands. It is still a question as to the number of parathyroids necessary to life. It has been noticed by many, in the removal of the parathyroids in animals, that the younger the animal the more violent are the ensuing tetanic symptoms. Acute tetany develops when the blood supply of the glands is suddenly cut off, while a slow destruction of the glands often results in chronic nutritional disorders and death finally without symptoms of tetany.¹

The special relation of infantile tetany to the parathyroid glandules is very obscure. The finding of hemorrhages by various investigators (Pineles,² Escherich,³ Erdheim,⁴ Yanase⁵) in cases of infantile tetany, throughout the glandular tissue is very interesting. These hemorrhages are claimed by Yanase to be due to birth traumata, as his oldest case, where fresh hemorrhages were found, was only fifteen days old. He says that these hemorrhages into the parathyroids injure the function of the glands and so produce a tetanic condition and that the beginning of the disease follows soon after the setting free of some unknown poison because of the insufficiency of the parathyroids. That infantile tetany is caused by an insufficiency of the parathyroid glands has been further demonstrated by the quick response

of some children afflicted to the administration in some form or other of emulsions of ox-parathyroid. Such cases have been reported by Halstead and Branham⁶ and others⁷ (Lowenthal⁸ and Weibrecht, 4 cases). However, all cases of infantile tetany do not respond to this parathyroid medication. Gerstenberger⁸ writes of a case of prolonged infantile tetany uninfluenced by subcutaneous injections of an aqueous extract of ox-parathyroid.

The histologic structure of the parathyroid glands is somewhat similar to the hypophysis, adrenals and islands of Langerhan's of the pancreas. A number of different types have been described. Kohn⁹ made three divisions:—

(1) A compact form, with the cells grouped closely together and with hardly any noticeable septum of connective and vascular tissue.

(2) A reticular form with narrow or wide cords of connective tissue, carrying the vessels, between the cells.

(3) A lobular form containing large vessels, especially veins, and a very thin septum carrying very fine capillaries between the lobules. Getzowa¹⁰ made practically the same division with the terms lobular, reticular, unarticulate and spongiform, and stated that all forms were sometimes found in one gland. All these types are without reference to the age. Kursteiner¹¹ states that the lobular form is not found in the glands of the newborn. From Yanase's study of the glands in 89 children he concludes that most often the compact or non-lobulated form is found, and that the farther the section is from the periphery of the gland the broader the vascular and connective tissue is.

The cells composing the great mass of the parathyroid have been commonly divided into three classes, grouped because of their peculiarities in staining and because of their difference in size.

The light-staining, or wasser-helle, cells have a round, good staining nucleus and with the hematoxylin-eosin stain the cell protoplasm does not take any stain, but is clear, while the cell borders take the eosin stain very sharply.

As Yanase describes it, the nucleus seems to hang free in the cell. The cells are said by Getzowa to be found especially in young and old people.

The pink or rosarote cells have a round good staining nucleus and the protoplasm takes a light pink stain.

The oxyphilic cells first described by Welsh are generally large

and are found most often near the periphery of the gland. The cell substance stains rather sharply with the eosin stain and the nucleus is very small and round. These cells are commonly found in adults and are almost always present after the tenth year of life, and have been found as early as the fourth year by Escherich and others.

In children Yanase describes the light-staining cells for the younger ones and the pink-staining cells for the older children as being the principal substance of the glands.

Fat cells are found in the stroma after the first year of life and are always present in the adult tissue. In the stroma the so-called mast-cells are found from birth on. With the hematoxylin-eosin stain these cells have a very small, rather deeply staining blue nucleus with a violet cell body and blue margin. The cell protoplasm is distinctly granular. Pigment taking the iron-reaction stain very deeply has been described by most writers. It occurs in the stroma and very often in the blood-cysts which are often found in pathologic conditions.

Amyloid degeneration, miliary tubercles, syphilitic inflammation, angioma, myoma and lymphoma of the parathyroid glands have been reported by Pepere.¹² Many other pathologic processes, including carcinomatous metastases (Erdheim), have been observed, but the most interesting with regard to infantile tetany are the different forms of hemorrhage into the glands.

In 2 cases in infantile tetany, Erdheim found old hemorrhages and pigment in the parathyroids. In 2 cases of infantile tetany Yanase found a very diffuse hemorrhagic condition of the parathyroids. In 4 of his cases of convulsions in the newborn, 3 showed hemorrhages; in 3 cases of slight convulsions hemorrhages were present, and in 2 cases with very slight muscular spasm hemorrhages were found. Koenigstein¹³ has described parathyroid hemorrhages in a one and one-half-month-old child, and Verebely¹⁴ has seen them in 2 infantile cases.

On the other hand, Thienich,¹⁵ in 3 cases of infantile tetany, reports the finding of histologically normal parathyroid glands. Curschman,¹⁶ in 2 cases, and Shiffer and Eckert,¹⁷ in 1 case each of infantile tetany, found no hemorrhages. Very lately Grosser and Betke,¹⁸ from a study of 16 cases of infantile tetany, found the parathyroids in 12 to be without hemorrhages, while in the other 4 hemorrhages were present. In 25 other cases which showed no signs of tetany, a hemorrhagic condition of the para-

thyroids was found in no less than 10 cases. In 3 cases of infants who died very suddenly, without evidence of tetany, they found a very diffuse hemorrhagic condition of the parathyroids, and in these 3 cases the autopsies showed nothing outside of the parathyroid lesions to account for death. From their study of the parathyroids in 41 cases of infants, 3 children and 4 adults they have concluded that infantile tetany can occur without any change in the anatomic structure of the glands, that there can be extensive changes in the parathyroids in non-tetanic individuals, and that the hemorrhages may come from inflammation or other causes irrespective of birth traumata. In a few cases hemorrhages have been found in the parathyroids of adults (Getzowa, Peterson,¹⁹ Verebely, Erdheim, Pepere).

In this series of cases the parathyroid glandules were removed in 35 cases ranging in age from birth to nine years. Of these, 22, including 2 cases of infantile tetany, were prepared and examined microscopically. In searching for the parathyroids, after the removal of the organs of the neck, the thyroid was exposed by dissecting away the muscles and fascia from its anterior surface. One or both of the inferior glands could then usually be seen about 1 cm. below the inferior poles of the left and right lobes of the thyroid. The lobes of the thyroid were then carefully lifted away from the trachea, starting posteriorly, and, in most instances, the upper parathyroid glands were found about midway between the superior and inferior poles and just hidden by the posterior edge of the thyroid gland. The parathyroids are light brownish-red in color, while the many lymph glands in that vicinity are much darker and the fatty tissue is of a whitish-yellow color. The glands were then placed in 4 per cent. formalin, or in Miller's solution, and were mounted by the chloroform-paraffin or xylol-paraffin methods. They were then cut in sections 6 microns in thickness, and were stained with hematoxylin and eosin and with von Gieson's stain. Some were stained with Weigert's fibrin stain and some with alon-carmin for pigment.

In regard to structure these cases have been classed as lobular or non-lobular.

CASE I. Male, newborn.

Clinical Diagnosis.—Asphyxia neonatorum.

Autopsy.—December 12, 1910.

Microscopically, four parathyroids found; at first glance ap-

pear similar to structure of adrenal glands. Lobular type. No hemorrhages. Apparently normal.

CASE 2. Ida P., three weeks.

Clinical Diagnosis.—Congenital syphilis and bronchopneumonia.

Autopsy.—November 15, 1910, showed broncho and lobar pneumonia, venous congestion of liver and kidneys, foramen ovale open. Two upper parathyroids found, but left lower one missing.

Microscopically, two of the glands showed the same pathologic changes. They were the non-lobulated type, and with the hematoxylin-eosin stain the cell nuclei took the blue stain deeply while the cell protoplasm was clear. The edges of the cell bodies took the eosin stain sharply. Vascular tissue, with an abnormally large amount of connective tissue, very plentiful. There were 4 or 5 cysts of red blood corpuscles, not surrounded by any vascular tissue, present. These cysts measured from 10 to 18 x 10 microns. They were not at the periphery, but rather toward the center of the glands. Many mast-cells present. No fat. Distinctly abnormal.

CASE 3. Helen L., four weeks.

Clinical Diagnosis.—Bronchopneumonia.

Autopsy.—December 8, 1910, showed a diffuse bronchopneumonia, venous congestion of liver, foramen ovale persistent.

Microscopically, the parathyroids were of the non-lobulated type with the characteristic light-staining cells. There were very thin lines of connective tissue throughout. The glands appeared very hyperemic and the vessels throughout were slightly dilated and filled with red corpuscles. Slightly abnormal.

CASE 4. Elsbeth H., four weeks.

Clinical Diagnosis.—Septicemia, icterus, enteritis.

Autopsy.—November 29, 1910, showed external and internal hydrocephalus, cerebral edema, enteritis, endocarditis.

Microscopically, the parathyroids were of the non-lobular type and showed nothing abnormal.

CASE 5. Klara G., one and one-quarter months.

Clinical Diagnosis.—Bronchopneumonia, otitis media.

Autopsy.—November 23, 1910, showed otitis media purulenta, tracheitis, bronchitis, bronchopneumonia.

Microscopically, the parathyroids were of the non-lobulated type and showed nothing abnormal.

CASE 6. Erwin N., two months.

Clinical Diagnosis.—Marasmus.

Autopsy.—November 25, 1910, inner organs normal, ductus botalli and foramen ovale persistent.

Microscopically, the parathyroids were of the non-lobulated type. Very few mast-cells seen. Rather large amount of vascular and connective tissue present. Many vessels dilated and filled with red corpuscles.

CASE 7. Paul W., two and one-half months.

Clinical Diagnosis.—Pertussis, bronchopneumonia.

Autopsy.—November 12, 1910, showed double otitis media purulenta, bronchopneumonia, persistent foramen ovale, duodenal ulcers.

Microscopically, the parathyroids were of the non-lobulated type, with both the light-staining and pink cells present. Very large amount of thickened vascular and connective tissue dilated widely in three or four places with red blood cells. Many mast-cells. No fat. Abnormal.

CASE 8. Max L., three months.

Clinical Diagnosis.—Marasmus.

Autopsy.—December 11, 1910, showed bronchitis, otitis media purulenta, open foramen ovale.

Microscopically, the parathyroids were of the non-lobulated type and showed nothing abnormal.

CASE 9. Max J., three and one-half months.

Clinical Diagnosis.—Bronchopneumonia.

Autopsy.—October 31, 1910, showed tracheitis, bronchitis, bronchopneumonia.

Microscopically, the parathyroids were of the combined lobulated and non-lobulated types in one gland, with both the light-staining and pink cells present. No pathologic changes present.

CASE 10. Frieda B., four months.

Clinical Diagnosis.—Pneumonia, meningismus.

Autopsy.—December 11, 1910, showed otitis media dextra, bronchitis, broncho and lobar pneumonia, hyperplasia of lymph glands, edema gravis, anemia of liver and kidneys, persistent foramen ovale.

Microscopically, the parathyroids were of the non-lobulated type. In one a small organized thrombus appeared in an artery; no other pathologic changes.

CASE 11. Alfred S., five and one-half months.

Clinical Diagnosis.—Bronchopneumonia.

Autopsy.—November 28, 1910, showed diffuse bronchopneumonia.

Microscopically, parathyroids were of lobulated type and showed no pathologic changes.

CASE 12. Elfrieda S., five and one-half months.

Clinical Diagnosis.—Pertussis, bronchopneumonia.

Autopsy.—November 15, 1910, showed right otitis media, purulenta, tracheitis, right adhesive pleuritis, bronchopneumonia, hyperemia of liver and kidneys.

Microscopically, parathyroids of non-lobulated type, with the characteristic light-staining cells. Few mast-cells. The vascular tissue throughout was very much dilated and thickened. Two small cysts of red blood corpuscles directly into tissue and situated very near the periphery. No fat. Distinctly abnormal.

CASE 13. Erna T., six months.

Clinical Diagnosis.—Angioma of face—operation.

Autopsy.—November 30, 1910. Kidneys very anemic. No other change of inner organs.

Microscopically, parathyroids were of lobulated type and showed no abnormal changes.

CASE 14. Charlotte K., seven months.

Clinical Diagnosis.—External hydrocephalus.

Autopsy.—December 10, 1910, showed external hydrocephalus, meningitis purulenta, rachitis, foramen ovale open, venous congestion of liver, enteritis.

Microscopically parathyroids were of lobulated and non-lobulated type in one gland. No pathologic changes seen.

CASE 15. Klara S., seven and one-half months.

Clinical Diagnosis.—Rachitis, congenital syphilis, bronchopneumonia.

Autopsy.—November 29, 1910, showed rachitis, syphilis, and diffuse bronchopneumonia.

Three parathyroid glandules were found, the upper pair being present, but the left lower gland was missing.

Microscopically, two parathyroids showed abnormal changes and were of the non-lobulated type. One parathyroid was normal and of the lobulated type. One of the non-lobulated parathyroids appeared very large and was composed of both light-staining and

pink cells. There was a marked increase of the vascular and connective tissue. The vessels were very thick, dilated and filled with red blood cells. Many lymphocytes appeared in the dilated vessels together with the red cells.

The other abnormal gland contained a few of both types of cells. But practically all of the gland substance was taken up by very thick and greatly dilated vascular tissue containing red corpuscles. A few mast-cells were seen. The periphery was a series of large blood cysts, the largest measuring 60 x 20 microns. The thickness of the vascular tissue averaged about 5 microns throughout. The other, the lobulated parathyroid, showed no pathologic changes.

CASE 16. Hans H., eight months.

Clinical Diagnosis.—Pertussis, convulsions.

Autopsy.—November 23, 1910, showed tracheitis, bronchitis, bronchopneumonia, 2 duodenal ulcers.

Microscopically, two types, the lobulated and non-lobulated glands, were found. The lobulated parathyroid showed no abnormal changes.

One non-lobulated gland was composed of the light-staining cells. There were a few mast-cells present. Abundance of vascular and connective tissue and the vascular tissue was markedly widened in many places and filled with red corpuscles. Appearance slightly abnormal.

CASE 17. Erick G., eleven months.

Clinical Diagnosis.—Tuberculous meningitis, miliary tuberculosis.

Autopsy.—November 24, 1910, showed a diffuse miliary tubercular infection.

Microscopically, both lobulated and non-lobulated types present in one gland. Most of the cells were of the pink variety, with a few scattered clear staining cells. Few mast-cells present. In one of the glands there was a very diffuse small round cell infiltration. No caseous area or giant cells present. No hemorrhages or fat.

CASE 18. Charlotte B., two years.

Clinical Diagnosis.—Hydrocephalus.

Autopsy.—October 31, 1910, showed external and internal hydrocephalus, rachitis, kyphosis, anemia and fatty degeneration of liver, enteritis.

Microscopically, parathyroids were of lobulated type and showed no abnormal changes.

CASE 19. Oswald P., two years.

Clinical Diagnosis.—Bronchiolitis.

Autopsy.—November 10, 1910, showed pharyngitis, tracheitis, diffuse bronchopneumonia.

Microscopically, the parathyroids were of the lobulated type and showed no pathologic changes.

CASE 20. Gertrude K., nine years.

Clinical Diagnosis.—Tuberculous peritonitis—operation.

Autopsy.—November 14, 1910, showed a general miliary tubercular infection.

Microscopically, lobulated type of parathyroid glands showing nothing abnormal.

Of these cases 17 were under one year of age and 3 over one year. Three cases (2, 12, 15) showed very distinct pathologic changes in the shape of blood cysts in the tissue. These blood corpuscles were not encapsulated by a thin line of connective tissue, as has been described by some writers, and they were not especially situated at the periphery of the glands. Of these three cases acute tetany could certainly be excluded. None of them had had convulsions during life. Of course in these cases it could not positively be said that they did not have latent tetany. They all had bronchopneumonia, in one case complicated by pertussis, and associated with rickets and syphilis in the other. Two of these cases were composed of the non-lobulated types of glandule and the other (15), seven and one-half months old, had both the lobulated and non-lobulated types. It is interesting to note that the cysts occurred only in the non-lobulated glands, and in all the other cases the lobulated glands were always normal.

Two other cases (7, 16) showed an abnormally thickened and increased amount of combined vascular and connective tissue, dilated and filled in many places with red blood corpuscles. Both of these children had pertussis complicated by bronchopneumonia, and one case (16) also had convulsions a short time before death. The non-lobulated types of glands were found in these two cases.

In the case (1) of the newborn the structure of the glands were of the lobulated type. With the exception of this case, those three months old or under were composed of glandules of the non-lobular type. Those over one year were of the lobulated type. In the others both lobulated and non-lobulated glands were found

in the same child, and in some both types were observed in one gland. For the most part the non-lobulated type was composed entirely of the light-staining cells and the lobulated type of the pink cells. In many of both types, however, both light-staining and pink cells were found. No oxyphilic cells were seen. The light-staining cells were larger than the pink cells. The nuclei of both types were round and about 1 micron in diameter; the diameter of the cells of the light-staining type averaged 3 microns in diameter, a little smaller at the periphery; while the diameter of the pink cells averaged from $1\frac{1}{2}$ to 2 microns.

CASE A. L., female, six days old.

Clinical Diagnosis.—Infantile tetany, congenital pyloric stenosis.

Child was born in the obstetrical department of the hospital; normal delivery. Shortly after birth vomiting commenced and patient was removed to kinderlinik.

Here physical examination showed intense general cyanosis and a very greatly distended abdomen. There were two small hemorrhages into the left conjunctiva. Chvostek's sign positive.

The result of the galvanic current made on the right peroneus.

Cathodic closure = 0.4 milliamperes.

Anodic opening = anodic closure = 0.2 milliampere.

Cathodic opening = 1.0 milliampere.

The enormous dilatation of the abdomen, together with persistent vomiting of black, curdy masses, continued until death, on the sixth day after birth.

In the experience of Professor von Pirquet he had never before found definite signs of tetany in children before the second month of life. The diagnosis was corroborated by the presence of Trousseau's phenomenon.

Autopsy.—October 14, 1910, showed hemorrhages into both pleuræ, congenital duodenal stenosis, dilatation of stomach and duodenum.

All four parathyroids were found.

Microscopically, they were all of the non-lobulated type and the changes in all were identical. The cells were of the light-staining variety. The nuclei measured 1 micron, and the diameter of the cells varied from 2 to 3 microns, being smaller at the periphery. Throughout the gland substance there was an extraordinarily large amount of vascular tissue and connective tissue, which everywhere was very wide, in some places 25 microns,

but most everywhere from 4 to 5 microns. In places the vascular tissue was dilated with red blood corpuscles. There were no hemorrhages into the parathyroid tissue.

CASE B. Hans G., three months.

Clinical Diagnosis.—Tetany, marasmus.

Admitted December 22, 1910, to kinderlinik with cough, laryngeal spasm and convulsions. There were tonic spasms of the arms present. The response to the galvanic current:—

Cathodic closure = 1.0 milliampere

“ opening = 2.0 “

Anodic opening = 3.0 “

No definite Chvostek's phenomenon.

This case could be reckoned as symptomatic of tetany, as the electrical responses were those of latent tetany.

Autopsy.—December, 1910, showed marasmus, lymphadenitis, colitis, hydronephrosis.

Only three parathyroids were found, the left upper gland being absent.

Microscopically, all three glands were of the lobular type.

Right lower parathyroid of lobulated type, composed of pink staining cells arranged in glandular groups and surrounded by vascular and connective tissue. Very few mast-cells present. No fat. There was no apparent excess of vascular or connective tissue and no hemorrhages.

Right upper of lobulated type with typical pink staining cells. Very few mast-cells present. More vessels present than in right lower gland. There was an increased amount of pigment throughout the stroma of the gland. No fat. No hemorrhages.

Left lower lobulated type with pink cells. Very few mast-cells. A little pigment in stroma. No hemorrhages. No fat.

In all three glands the nuclei took the stain very differently, some taking it much more intensely than others.

No pathologic changes noted.

In these 2 cases of definite infantile tetany four glandules were present in one and three in the other. No parathyroid tissue was found in the thyroid or thymus tissue in either case. In Case A all glands were of the non-lobulated type, while in Case B all were of the lobulated structure. Case A showed a definite increase in the size and amount of the connective and vascular tissue.

In not one of the seven glands of both cases were hemorrhages found.

My results, in regard to the question raised by Pineles, Erdheim, Escherich and Yanase as to the connection of hemorrhages into the parathyroid tissue with infantile tetany are shown by the following table:—

TABLE I.

Clinical Intra-vitam Findings	Post-mortem Findings in Parathyroids			Total
	Normal	Increased Vascular and Connective Tissue	Hemorrhages	
No convulsions	13	2	3	18
Convulsions	1	1	0	2
Definite tetany	1	1	0	2
Total	15	4	3	22

A further summarization of the 7 cases showing pathologic changes of the parathyroid glands may be represented by Table II.

TABLE II.

Clinical Diagnosis	Post-mortem Findings in Parathyroids		Total
	Increased Vascular and Connective Tissue	Hemorrhages	
Bronchopneumonia	1	1	2
Pertussis and bronchopneumonia	1	1	2
Pertussis, bronchopneumonia, convulsions	1	0	1
Bronchopneumonia, rachitis, syphilis	0	1	1
Infantile tetany	1	0	1
Total	4	3	7

In this special work a close connection between hemorrhagic lesions of the parathyroid glands and infantile tetany could not be found.

I wish to thank Professor Ponfick, director of the pathologic department of the University, for allowing my work to be done in his institute, and Professor von Pirquet for his help and the interest taken in this work, and Drs. Behne and Veit for practical assistance in the laboratory.

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THE ETIOLOGY OF SCARLET FEVER.—R. W. C. Pierce (*Lancet*, October 28, 1911) reports a series of cases which he believes tend to confirm his opinion that a fair proportion of the patients admitted into hospitals as suffering from scarlet fever, although presenting signs which are indistinguishable from those of true scarlet fever, have not in fact necessarily contracted the infection from a previous case of the disease.—*Medical Record*.

REPORT OF A CASE OF DIABETES MELLITUS IN A CHILD UNDER ONE YEAR OF AGE.

BY PERCIVAL J. EATON, M.D.,

AND

E. B. WOODS, M.D.

The child whose case we wish to report was born in the country about forty miles from Pittsburgh, and was brought to us by Dr. J. C. Stahlman, of Vandergrift, Pa., to whom we are indebted for much of the history, for many analyses of the urine, and for details of treatment. The child visited us first on February 6, 1911, and presented the following:—

Family History.—Grandmother on mother's side died in 1908 of diabetes mellitus. Father and mother rather undersized, spare; apparently in good health. No specific history. Father has had chronic appendicitis eventuating in excision. One older child died of chronic appendicitis August, 1909, ill four months; and this child was born ten months later in June, 1910. The mother had acute indigestion during the last two months of gestation, and for one month after delivery. The father's family are all of constipated habit. There have been no marriages of relations on either side so far as known. The specimens of urine of both father and mother were analyzed May 26th, and found free from sugar.

Previous History.—The child was instrumentally delivered, and had some lesion over left eye which took five or six weeks to heal up. Baby breast fed, and appeared to thrive well till December, 1910, when it was brought to Dr. Stahlman because of the appearance of a swelling on the third toe of the left foot. There then was a minute vesicle on second joint, and, thinking it the result of an infection, a boric acid lotion was used. The following week the fourth toe on the right foot presented a similar appearance. The toes were reddened and swollen, but apparently not painful to the touch. The child manifested no symptoms of illness at this time. It had been making a gain of from $1\frac{1}{2}$ to 2 pounds per month, and about January 7, 1911, weighed $16\frac{1}{2}$ pounds. It was now about seven months old and had cut two

teeth. The toes remained in the same condition as above noted, no treatment appearing to affect them. About January 15th the mother noticed that the child's diapers were sticky after urinating, and stiffened upon drying. About January 20th the mother collected an ounce of urine, and Dr. Stahlman found it to have a specific gravity of 1,035 and a very decided sugar reaction, using the Haines reagent. On January 21st another specimen had a specific gravity of 1,037, with sugar reaction marked. Repeated examinations at short intervals gave specific gravities of from 1,016 to 1,035, most often about 1,026; acetone present in all specimens after the first two or three weeks and occasionally diacetic acid. The specimen examined by Dr. Stahlman previous to his last report to us was on April 22d, when the specific gravity was 1,021; some acetone, but no diacetic acid. Our own examinations up to this time (April 22d), and later, have confirmed these findings. The first specimen was examined by us on February 6th: specific gravity, 1,030; no albumin; sugar present. On February 13th a second specimen was received: specific gravity, 1,032; no albumin, and with a typical reaction for grape sugar; acetone and diacetic acid present. Saccharometer reading over 10 per cent. (fermentation test). March 2d, specific gravity, 1,030; no albumin; grape sugar present; acetone and diacetic acid present.

For a time there was thirst and increased diuresis, but under date of February 9, 1911, the mother writes me that the child was losing his appetite and did not care for water, taking only about an ounce a day. The child began to lose weight early, and about March 15th had lost 2 pounds, 6 ounces.

On February 6th (the date of the child's first visit to us), we had suggested that the child have breast milk only, as for several weeks it had had oat-jelly in addition. At that time, too, it was given some gray powder and iodid of iron. After using the iron and gray powder for about four weeks and seeing no result, Dr. Stahlman put the child on bicarbonate of soda with $\frac{1}{10}$ grain codein and trypsogen tablets, starting with one-half a tablet three times a day and increasing to one tablet three times a day. About March 8th he began feeding a washed cream mixture in addition to the breast. This mixture seemed to work well, and has since been continued. On March 26th it was found to have gained 4 ounces; April 9th, 2 ounces; April

30th, 2 ounces. Under date of May 2d the doctor writes that in addition to 24 ounces of this washed cream mixture it is taking some meat broth. Up to the time of administering these foods the child was very restless, especially at night, but latterly has been less disturbed, though it demands and gets the breast several times during the night. Regularity of feeding has not been attained. The child has been very constipated and has had to have milk of magnesia and enemas. Later was given cascara, which seemed to give good results.

On May 22d Dr. Woods and myself visited the child at its home and found it in very fair condition. It weighs $14\frac{3}{4}$ pounds, and is very active physically and very bright mentally. Though the weather has been very hot and sultry, its thirst has not been appreciably increased—it rarely taking more than an ounce of water at a time. Just now its bowels are in good order, the tryptogen having been omitted, apparently having had no effect on the disease and probably causing constipation. At all events, since omitting it, the bowels have moved spontaneously. The toes are no longer red, but are still swollen and rather fusiform in shape. The child's color is fairly good. It has been having breast milk, beef juice (the meat broths not now being relished) and the washed cream mixture. This latter is prepared by allowing a quart of milk to stand twelve hours, then removing all the cream, shaking this in a Mason jar with an equal amount of water, then allowing the cream to again rise, and, after skimming the cream, making thereof a mixture one part to four of water, adding a bit of saccharin and a little (indefinite) amount of lime water. The child rarely takes more than 5 ounces of this mixture at a feeding.

We brought home a specimen whose specific gravity was 1.044, no albumin, sugar present, acetone present, diacetic acid absent, microscope negative. (Fermentation test, $5\frac{1}{2}$ per cent.) Dr. Stahlman has sent under date of May 27th the report of a specimen examined by him, which showed specific gravity, 1.044; albumin, none; sugar present by Nylander's and Haines's reagents; acetone present; diacetic acid absent; no odor. (Fermentation test about 7 per cent.) Dr. Stahlman also reports that the child has not been resting so well the past week, and that it does not take its food well, the feedings having to be forced. The hot days seem to affect it a good deal.

In reviewing the literature of the past fifteen years we have been able to collect reports of 647 cases of diabetes mellitus in children, and of these but seven were under one year of age. We have been able to discover but 4 more cases to add to the above, namely, in children under one year.

In 1901 Young reported a case of a six-months-old infant and Orloff of a four-months-old infant.

In 1910 Lauritzen reported a case of an eight-months old infant and Maurel of a child under one year.

In 1899 Hagenback collected 77 cases of diabetes mellitus in children under one year, but we have been unable to find reports of these cases. Excluding Hagenback's series we have only been able to collect 11 cases of diabetes mellitus in children under one year.

In discussing the subject of diabetes mellitus we wish to draw attention to the fact that small quantities of milk sugar may appear in the urine of breast- and bottle-fed children, especially in the latter class of cases, where milk sugar is added to the food. Sugar excreted under these circumstances has no pathologic significance in so far as diabetes mellitus is concerned, but must be differentiated from grape sugar. Attention must also be given to the fact that transitory glycosuria occurs much more often in children than in adults, and is supposed to be due to an impairment of the function of the pancreas due to some intoxication. In a case such as is here reported it is, for the matter of prognosis, very desirable to be able to decide whether a given case is true diabetes mellitus or merely a transitory glycosuria. Though the case reported has continued for more than four months, and though the symptom-complex is fairly complete, yet the absence of increased thirst and diuresis makes us doubtful, or, at least, causes us to refrain from giving an absolutely unfavorable prognosis.

Etiology.—This has been so fully discussed in the literature that here reference will be made only to a few points. Heredity, which is dwelt upon at length by some authors, has apparently little to do with our case. There is no family diabetic habit, so far as we can tell, and we have no reason to suppose that the older child in this family died of diabetes mellitus. There have been no consanguineous marriages, nor is there any ground for suspecting syphilis. There remains of interest to us only the

question of the effect of traumatism, and we know there was a rather bad left side lesion at birth. The head now seems to be normal.

Symptomatology.—The existence of thirst, diuresis, wasting of the body and the stiffening and stickiness of the linen, accompanied by the excretion of grape sugar, make up the complete symptom-complex.

Prognosis.—It seems to be the consensus of opinion that the prognosis in true diabetes mellitus in children is absolutely bad, and that the duration of the disease is rarely more than twelve to eighteen months.

Treatment.—So far as we have been able to learn, no drug or combination of drugs has so far had any effect on the disease, and the only philosophic treatment would seem to be the exhibition of such dietetic and hygienic measures as would tend to keep the child in the best possible physical condition.

NOMA.—Marcel Breuer (*Arch. de Méd. des Enf.*, September, 1910) has made a study of the specimen from a case of noma observed by him, in an attempt to find a specific cause of the disease. This is a disease that generally occurs in children who have been weakened by some infectious disease such as measles, scarlatina or whooping-cough. Strange to say, it is more frequent after measles than after the other diseases. This was the condition in the author's case. Here the gangrene involved both lips, the palate, and the nose, and ended in death. Autopsy showed many foci of gray hepatization in the lungs. Many attempts have been made to isolate a specific bacillus as the causative factor in this frightful disease, but without success. The straptococcus and staphylococcus are always present, but are not the true cause of this mixed infection.

Schimmelbusch, in 1889, found a large number of short rods, with round extremities, often in chains, and in twos, and sometimes prolonged, which stained with the Gram stain. They were easily cultivated on gelatin and developed colonies. Inoculation into animals caused abscesses but never necrosis. In the author's case similar rods were found in the gangrenous tissue, but never in the blood of the patient, and tubes inoculated from this blood remained absolutely sterile. The author does not believe that this is the specific agent of the disease.—*American Journal of Obstetrics.*

A NOTE ON THE SEARCH FOR THE CAUSATIVE FACTOR OF SCARLET FEVER.*

BY MATTHIAS NICOLL, JR., M.D.,
New York.

In July last I undertook a study of the enlarged lymph nodes occurring in scarlet fever, according to the method of Dr. Vipond,[†] and as recently done by Dr. Kolmer.[‡] With the usual precautions as to disinfection of the skin, etc., I aspirated into a syringe, which had been thoroughly boiled, some of the contents of an enlarged cervical node in 2 cases of scarlet fever, inoculated various media and produced no growth. Owing to lack of material, the study was not resumed until October, when another fresh case gave opportunity for the same procedure. What was my surprise to obtain on all the inoculated tubes a pure culture of a spore-bearing bacillus! On the following day another node in the same case gave an identical result. Five cases successively produced the same bacillus from inguinal nodes. Owing to the presence of this organism in the original smears, I was able to overcome the scientific skepticism of the director, Dr. William H. Park, and, to some extent, the hatred of a spore-bearer among his staff of bacteriologists, and an exhaustive study of the cultural characteristics and morphology of this organism was made by Drs. Krumwiede, Grün and others. Guinea pigs, rabbits and one monkey were inoculated, with twenty-four-hour broth cultures, and in all were produced fever, marked diarrhea, loss of flesh and moderate enlargement of the neighboring lymphatics, from which also the bacillus could be recovered after a week. No rash was observed in any case, neither was there desquamation. At this time, Dr. Vipond, at my suggestion, brought to us his organisms for comparison, and it was soon discovered that there was between them marked morphologic and cultural differences. It furthermore developed that our organism was extremely resistant to heat, surviving boiling under pressure for at least twenty minutes. The syringes were then autoclaved on two successive days, and the experiment repeated on eleven other patients, on some more than once, with the result that no organism

* From the Research Laboratory, Department of Health, New York City.

† ARCHIVES OF PEDIATRICS. 1911, p. 564.

‡ *American Journal of Diseases of Children*, Vol. II., No. 5, p. 329.

of any kind was found. I may add that Dr. Vipond personally performed the aspiration on two of these patients. Furthermore, the organism which he brought with him was inoculated into four rabbits and two monkeys and produced practically the same symptoms as that which we had isolated. Where did the latter come from? The piston of the syringes which I had used in the work and which had subsequently been boiled was stirred into broth and plates inoculated. From all our bacillus was obtained. Furthermore, six stock syringes, which had never been used, gave the same result. I am told that asbestos, with which these pistons were packed, comes from the oldest prehistoric rock. Perhaps our scarlet fever bacillus had the same origin. This work, I believe, was not without value, since it has taught us the necessity of absolutely indisputable sterilization in all such experiments, and it has demonstrated what seems to me a most important fact, namely, that in 18 cases of scarlet fever, ill from two to twenty-four days, enlarged, but not suppurating, lymphatic nodes, in 4 cases in the cervical region and in 19 in the inguinal region, together with an inguinal node removed postmortem from a septic case of the disease, in no instance showed the presence of streptococcus or other organism. Direct smears from all but the first 2 cases showed, by the presence of lymph cells, that the node had been tapped. Here, then, is a disease which involves the lymphatic system from the neck to the groin in forty-eight hours or less, and does so apparently without the aid of pyogenic organisms. Dr. Kolmer's series of 11 cases, recently published, justifies the same conclusion. Before closing, I wish to express my deep-rooted suspicion of all reported cases of experimental scarlet fever occurring in rabbits, such, for instance, as Cantacuzene has recently announced. The rash of scarlet fever is frequently difficult of diagnosis in human beings, and such a rash in an unshaved rabbit must necessarily be largely a matter of personal opinion. On the other hand, the shaving of normal rabbits, owing to the delicacy of their skin, produces a dermatitis, persisting for a number of days, which an enthusiast might reasonably ascribe to scarlet fever. Furthermore, the temperature curve in these animals is so erratic and readily disturbed that little is to be deduced from this source, while their throats and tongues are very unsuited to clinical observation.

NOTES ON NOMA, WITH A REPORT OF A CASE TREATED WITH SALVARSAN.*

BY MATTHIAS NICOLL, JR., M.D.

During the spring and early summer of the present year there occurred an unusually large number of fatal cases of noma in the City of New York.

At the Scarlet Fever Hospital of the Department of Health there were 11 cases and 9 deaths. So much confusion exists in the nomenclature of the various ulcerative conditions about the mouth, especially in children, that it would seem expedient to arrive at some understanding as to what pathologic condition may properly be termed noma. Thus, small ulcerations occur on the inner surface of the cheek from which smears show the presence, often in great numbers, of the characteristic fusiform bacilli and spirochetæ, but which, nevertheless, readily yield to the application of caustics or milder local remedies. Other cases, not to be differentiated bacteriologically from the latter, do not yield to treatment, the ulcero-membranous process extending with startling rapidity to the gums and then to the neighboring alveolar process of the jaw. Again, marginal ulcerations about the teeth, together with a spongy condition of the gums, yield similar bacteriologic findings, but in otherwise healthy children do well under treatment by local application.

The so-called Vincent's angina, in spite of very widely extended lesions, usually produces but few general symptoms, and, after a somewhat tedious local treatment, runs a favorable course without extensive loss of tissue.

For the purpose of these observations, the term noma is to be understood as designating a rapidly-spreading gangrenous process, beginning usually on the mucous membrane of the cheek and gums and involving all surrounding tissues, including bone, showing little tendency to self-limitation and from which fusiform bacilli and spirochetæ may be obtained in great number in the smears.

The cases at the Scarlet Fever Hospital involved only the

* From the Research Laboratory Department of Health, New York.

mouth and face, although the same process may occur about the external auditory meatus, rectum and vulva.

Observations of this disease, extending over many years, especially at the New York Foundling Hospital, together with the study of most of the 11 cases referred to above, justifies the writer in arriving at the following general conclusions:

(1) The disease is essentially one of contagious disease hospitals and institutions for young children, but few typical cases having been reported from other sources.

(2) It is very largely confined to children under five years of age.

(3) It attacks almost wholly those suffering from marked malnutrition, and whose resistance has been lowered as a result of previous disease.

(4) Measles has long been regarded as one of the predisposing causes. In the 11 cases mentioned, 4 had an antecedent attack of measles during their convalescence from scarlet fever.

(5) During the occurrence of an epidemic of noma a large number of minor ulcerative or ulcero-membranous conditions are found about the mouth and gums in otherwise healthy children, showing the same organisms as those found in true noma, but showing little tendency to spread.

(6) In the epidemic at the Scarlet Fever Hospital there was no positive evidence of direct contagion, the cases being scattered over five floors of the building.

(7) Occurring, as it does, in patients in a low state of nutrition, the disease shows little tendency either to spontaneous recovery or to yield to local treatment, or even be influenced by radical surgical measures—curetting and removal of diseased tissues. Occasionally, a sequestrum of dead bone is formed, sharply marked off by healthy tissues and spontaneous healing occurs. In the 11 cases mentioned 1 took 'this course—that which occurred in a patient in previously fair general health.' In another the same process was seen after treatment by salvarsan. The other 9 died after treatment which varied from the application of strong caustics, and frequent cleansing of the parts, to removal, under an anesthetic, of all the visible diseased tissue, including bone. It cannot be said that radical measures had any apparent effect on the progress of the disease. Indeed, in some cases they seemed to act adversely.

The case treated by salvarsan is as follows: Robert M., aged five, admitted to the Scarlet Fever Hospital June 10, 1911, on the fourth day of his illness—a well-developed and well-nourished boy with the typical symptoms of scarlet fever of a severe type. The heart was normal, the lungs showed the presence of a moderate bronchitis. He was said to have had measles some time ago, otherwise his health had been good. There was a pseudomembrane on the right tonsil, from which cultures did not show the presence of Klebs-Loeffler bacilli. On admission he was given 5,000 units of antitoxin, and on the following day 10,000 units. There was a profuse discharge from the nose and mouth. For forty-eight hours after admission he was delirious a good deal of the time, with a rapid pulse and high temperature. June 15th: The condition was very much better: temperature and

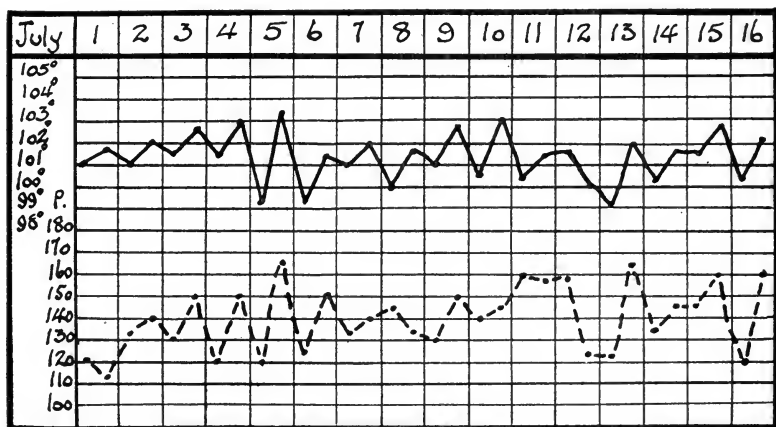


Chart Showing Pulse and Temperature.

pulse had fallen, the discharge very much decreased. June 23d: The cervical nodes had been swollen from the first, gradually increased in size and were now very tender. June 24th: Glands incised and drained. The temperature had been keeping up, evidently due to the cervical adenitis, but fell twenty-four hours after the operation. June 29th: Both ears discharging. July 4th: There was an ulcer on the inner side of the right cheek one-eighth inch in diameter opposite the upper molar teeth, and another similar one opposite the lower molars. The gums were

not involved. July 5th: Gums bleeding and spongy, the ulcers now having extended to them. There was another ulceration on the left cheek opposite the upper molars. The right cheek was very much swollen, the eye closed, the left cheek less so. Both swellings were of stony hardness. The patient's general condition had become very bad. He was greatly emaciated and very anemic. The odor from the mouth was very offensive. In the afternoon of this day he was given three-tenths of a gram of salvarsan in 200 c.c. of diluent intravenously. July 6th: The swelling of the cheeks on both sides had increased very markedly, the skin being tense, shiny, and somewhat red. The bones of the jaw were exposed both above and below on the right side, denuded of periosteum and black. Between the bare bone and neighboring gum there were ragged, sloughing walled sinuses running up and down for some distance. Pieces of broken-down tissue came away with irrigation. Smears from the original ulcers showed the fusiform gram negative bacilli and spirochetæ; later smears, mixed bacteria. Local treatment consisted in frequent cleansing of the pockets, packing with gauze saturated with various antiseptics and with antistreptococcus serum. July 9th: The condition was apparently stationary. The sinus in the left upper jaw runs up to a point opposite the parotid gland. Large amounts of broken-down tissue came away through this, some apparently of the gland substance. July 11th: The local and general condition continue the same, and while it was apparent that the disease was making no characteristic advance, it was thought advisable to repeat the injection of salvarsan in the same dosage. July 12th: The same local reaction about the swollen right cheek was noted twenty-four hours after the injection. The swelling of the right cheek had been steadily diminishing and was now but little marked. July 16th: There was a fine hemorrhagic eruption on the face, hands and legs resembling purpura. July 20th: The eruption was still present, but fading. The teeth opposite the lesions are all loose. The sequestra of bone are being sharply delimited from the healthy. August 15th: The boy was out of bed part of the day; had been gaining rapidly in general health and strength. The lesions were cleansed regularly. September 18th: The patient's general health is excellent. It was not thought advisable to remove the loosened sequestra, which involved the alveolar process

through one-half of its diameter, approximately opposite three teeth of the upper and lower jaws on the right side, and upper on the left. Running up from the latter the sinus is still open for a short distance, but is clean. A slough in the bend of the left elbow caused by the leakage of some of the salvarsan into the tissues has completely healed without loss of motion. October 10th: The sinus has been healed for several weeks; the boy is round about the hospital in excellent condition.

The effect on pulse and temperature following the injection of salvarsan is shown in the accompanying chart. The pulse remained fairly rapid for several weeks thereafter; the temperature slightly elevated, 99° to $100\frac{1}{2}^{\circ}$ F. The noticeable local reaction, consisting in increased swelling and redness in the infected cheek twelve hours after each injection, was also observed in another case following each of two injections and which did not recover. The latter was one in which the disease made an unusually rapid progress and involved both sides of the face in a patient suffering also from severe scarlatinal nephritis, with marked edema of the face and extremities.

The writer has not found any recorded instances of salvarsan having been used in a true case of noma. In allied conditions it has been given apparently with beneficial results. Thus Rumpel employed it in doses of 3 to $\frac{5}{10}$ grams in 7 cases of Vincent's angina, 3 of which were negative to Wassermann, the others not having been tested. Healing took place in five to sixteen days without other treatment, the organism disappearing from the smears within from four to twenty-five days. Gerber also made use of it successfully in various forms of ulcerations about the mouth, including scurvy, which showed the typical organisms.

Had it been proven that the spirochetæ found so abundantly were the specific cause of the disease, there would be no good excuse for not giving salvarsan as a matter of routine in all cases whose physical condition would lead one to fear the occurrence of noma, and while the evidence of such a causal relationship is yet but circumstantial, it is very convincing.

Organisms not to be distinguished morphologically may be found not infrequently in apparently normal mouths, but rarely in large numbers. Such was the case during the epidemic of noma at the Scarlet Fever Hospital. Dr. McDonald, the assist-

ant resident physician, examining a large number of cases, found the fusiform bacillus and spirochetæ often in preponderating numbers in smears from various types of stomatitis, especially in those of an ulcerative character.

Lately Blühdorn has found the two organisms, sometimes the bacilli, sometimes the spirochetæ predominating, in diphtheria and scarlet fever throats, syphilis, ulcerative stomatitis, Vincent's angina, and normal throats. He believes that these organisms normally inhabit the mouth in health, but increase greatly under certain pathologic conditions.

Gerber thinks that stomatitis of a membranous and ulcerative nature is probably due to a symbiotic growth of the organisms, and finds that the spirochetæ may readily be recognized in the dark field.

Lately, Ruth Tunnicliff has made a careful study of these organisms, and reaches the following conclusions: "Strains of fusiform bacilli isolated in pure culture from the normal mouth, ulceromembranous angina, gingivitis and noma appear culturally and morphologically to be the same organism. The cultures show that the bacilli and the spirochetæ are different forms of the same organisms. Whether the spirilla formed from the fusiform bacilli are the same as those found in the lesions themselves cannot be decided on account of the inability to reproduce the lesions in lower animals."

She found that the use of killed cultures of fusiform bacilli and spirochetæ in a case of noma caused an increase in the amount of specific opsonins and appeared to produce some beneficial effect.

In conclusion, it would seem advisable even in the absence of positive evidence that spirochetæ are the specific organisms of noma to make use of salvarsan in every case which does not immediately yield to local treatment, for it cannot be denied that other remedies have had little or no effect in controlling this horrible disease and the use of salvarsan is at least logical.

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THE EFFECT OF SALVARSAN ON CONGENITAL LUES.

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Since Ehrlich placed salvarsan in the hands of the profession literature has been full of reports of its use. These reports have not been uniform, for some have claimed wonders for the drug, others have condemned it, and still others, taking the middle ground, believe that much may be expected of it, but not as much as was at first claimed. That salvarsan does not take the place which was first given to it, that of "Therapia Sterilisans Magna," we all agree, but that it is a most valuable adjunct to our therapeutic agents for the treatment of lues there can be no doubt.

There may be many reasons for the lack of uniformity in the results from the administration of salvarsan: first, the case may be one, as we see with mercury, which is refractory to arsenic; second, there may be an idiosyncrasy on the part of the patient toward arsenic; third, there may be conditions in the individual which may contraindicate its use; fourth, there may be errors in technic; and, last, but by no means least, the mode of administration may be the influencing factor.

It is not the purpose of this paper to discuss this preparation from all its aspects, but to consider it in connection with congenital cases of lues and to cite my experience with it in this connection.

Ehrlich first believed that a single dose of salvarsan should be given sufficiently large to sterilize the entire system without injury to the individual, so that there would not be any spirochetes remaining which might become arsenic fast. Experience, however, has shown that in the vast majority of cases one dose is not sufficient to accomplish this purpose; and, also, that improvement has followed subsequent injections, so that if there might be developed arsenic fast spirochetes this is rarely the case. Again, in the methods first employed (the subcutaneous and intramuscular injections) it is hardly probable that the absorption of the preparation into the system was as rapid as was expected. This has been frequently demonstrated by the recovery of arsenic from the site of injection.

Clinicians are now employing repeated injections. Iversen injects his patients intravenously, and two days later, intramuscularly with a suspension, with the idea of causing a storage of the drug. He predicts that this will be the method of the future. It can be safely said that it will be some time before it will be known exactly how many injections will be required, and probably there will be no hard and fast rule, because individual cases will respond in individual ways.

Salvarsan may be administered subcutaneously, intramuscularly and intravenously. It has been shown that when the drug is given by mouth it has little or no effect (Ehrlich), probably due to chemical changes taking place before it can be absorbed. Kromayer used salvarsan by rectum and noticed some results in four or five days which were satisfactory but were only transitory. The tendency now seems toward the intravenous route, which has its advantages and disadvantages, but if the physician is sufficiently experienced and the drug is injected according to the laws of asepsis the disadvantages are removed, and there is no swelling, pain, induration and probable necrosis and inability to return to one's occupation.

In the treatment of cases of congenital lues there are two modes of procedure: first, the direct method; and, second, the indirect method. The direct method includes the subcutaneous, intramuscular and intravenous routes. In the choice of these, many influencing factors are to be considered, more particularly the age, size of veins and anesthetic. Doblin believes the dose to be 0.005 grams per kilogram of body weight.

Although Weschelmann, Sequeira and others have obtained good results in injecting the infant, the experiences of Herxheimer and Reinke, Weschelmann, Doblin and others should influence us before we adopt this method of treatment. The explanation of the unfavorable results has been that too many endotoxins are liberated at one time for the infant to overcome. Also many of the unfavorable terminations may probably be traced to secondary infection and necrosis at the site of injection, but we have no way to obviate this, as the veins of the very young are too small for the intravenous route. Occasionally older children have small veins and are thereby deprived of the best means of treatment.

In considering the intravenous route it is essential that the veins be sufficiently large. Where the median basilic is too small a

thorough search should be made for a vein large enough for the injection. In giving the intravenous injection it may become necessary to expose the vein. When this is the case, and when the patient is not reasonable, it becomes advisable to give an anesthetic.

The indirect method of treating congenital lues with salvarsan includes the treatment of: first, the pregnant woman; second, the nursing mother; and, third, the treatment of the patient with the serum of the mother injected with salvarsan.

The treatment of the pregnant woman with salvarsan has yielded unfavorable results. Gluck injected a woman seven months pregnant, with the result that the fetus died on the following day. Pregnancy has been considered a contraindication to the use of salvarsan. Weschelmann has reported 10 pregnant women with the result that normal delivery occurred in 3 instances. Of these 3 cases only 1 was born without any symptoms, and gave a negative Wassermann. Weschelmann believes that even in the 1 case the cure is doubtful, "as the freedom from symptoms in the beginning does not *per se* prove the absence of syphilis, while, on the other hand, healthy children may also be born of syphilitic mothers."

The method of injecting the nursing mother is by far the best one for the infant, and although unsuccessful reports are made by Kakels, Peiser, Rosenthal and Escherich, most brilliant results were obtained by Taege, Duhot, Sequeira, Dobrovitz, and others. Ehrlich's explanation of the results obtained in the cases benefited by this indirect route is that since no appreciable amount of arsenic is found in the mother's milk, and as salvarsan when given by mouth has little or no effect, there must be antitoxins eliminated in the milk. He states that when salvarsan is injected into the mother the effect of the salvarsan upon the spirochetes is that it destroys them with the liberation of endotoxins, which in turn give rise to the formation on the part of the mother of antitoxins which are eliminated with the milk. These antitoxins, when entering the infant, kill some spirochetes with the liberation of endotoxins, which cause the formation on the part of the baby of antitoxins, and there arises a cycle in the infant.

Meirowsky and Hartmann used serum of a patient treated with salvarsan with questionable results, and Peiser treated 2 cases with negative results. However, Marinesco, Plaut, Scholtz, and L. Michaelis have reported the curative effect of this method.

Jeanselme had 2 cases in which he resorted to mercury after employing the indirect method. In 1 case, soon after the mother had been injected, the baby developed a macular syphilide, and a Parrot's paralysis soon followed. The baby became emaciated and cachectic, and mercury was resorted to with a resulting cure. In the second case a discrete exanthem and a few mucous patches, which were present before the mother was injected, became more marked, and again mercury was resorted to. He believed that had not mercury been used in the first case it would have terminated fatally.

Baisch reports a case of pemphigus neonatorum in which the mother was treated intravenously. On the fourth day she nursed the baby. In the meantime the symptoms did not increase. On the seventh day new bullæ appeared. The next day the infant received 0.015 gm. salvarsan in the gluteal region. On the ninth day the lesions were almost dried up. On the eighteenth day new bullæ appeared. Another dose of salvarsan was given and the lesions promptly disappeared. On the fortieth day the infant continued apparently well.

Whether the favorable results obtained are to be considered as permanent cures it is almost too soon to say, but I believe many infants' lives may be saved by the indirect method, so that the subsequent use of salvarsan or mercury may be employed when necessary.

As yet not sufficient evidence has been accumulated for the basing of definite conclusions in the treatment of congenital lues with salvarsan. It is with the purpose of adding my mite of experience, with the hope that others will do likewise, that I report my cases.

CASE I. C. R., white, male, two months old; one of three children. There were three miscarriages before the living children; the first at five months, lived eight hours; second at six months, born dead; third at seven months, lived fifty-six days. Father and mother denied syphilis. Infant was brought to me on December 13, 1910, for a cold which he had had since he was six days old. Physical examination: fairly well nourished baby, weighing $9\frac{1}{4}$ pounds; spleen extended $1\frac{1}{4}$ inches, and liver $1\frac{1}{2}$ inches below costal border; wide separation of sutures; snuffles and excoriation of anterior nares. Otherwise the history was negative. Wassermann positive in baby; Wassermann positive in father and mother.

January 11, 1911. Mother was given 0.5 gm. salvarsan, intravenously, and was kept in bed. There was no febrile reaction above 99° F. Mother suffered no inconvenience, and was allowed to return home to her household duties the next day.

January 14, 1911. Baby gained 3 ounces and spleen and liver were 1 inch and 1¼ inches respectively below costal margin. Mother noticed that her milk had increased.

The gain in the baby's weight was ½ pound the first week, 6 ounces the second week, and ½ pound the third week.

January 28, 1911. Mother noticed slight elevation of skin about anus of baby when she gave enema. This was examined and proved to be an abscess. It was opened, and scrapings from it were examined for spirochetes with negative result.

February 4, 1911. Wassermann positive in mother.

February 25, 1911. Cold almost well.

March 4, 1911. Had bad cold. Said to have had fever all day before. Temperature 99²/₅; respiration 110; pulse 29. Large moist râles heard over both lungs. Otherwise examination was negative. Weight 11 pounds 12½ ounces.

March 14, 1911. Had lost 4½ ounces. Cold much improved; sleeps well.

March 16, 1911. Improved. Gained 2 ounces.

April 29, 1911. Weight 12 pounds 4 ounces. Wassermann weakly positive. Mother gave negative Wassermann. Mercurial ointment was ordered for baby.

May 16, 1911. Because of the overaction of mercury the ointment was discontinued. Wassermann negative.

May 28, 1911. Baby's weight 12 pounds 11¾ ounces. Liver ½ inch below costal border.

CASE II. J. P., white, male, aged three days. Was seen with Dr. J. K. Newman, who had delivered the baby, weighing 8 pounds, on February 2, 1911. A negative family history was obtained, with the exception of tuberculosis in mother. Physical examination showed palms of hands and soles of feet scaling; snuffles; fontanel very large; wide separation of sutures; liver extending well below costal border, and spleen very much enlarged. Wassermann positive in both mother and baby.

February 28, 1911. Baby had lost weight. Mother received 0.6 gm. salvarsan, intravenously. Baby given no other food but mother's milk.

March 7, 1911. Baby much improved and had gained in weight. Snuffles had cleared.

April 1, 1911. Baby returned with thrush. *Oidium albicans* found in lesions of mouth. Baby had been having five or six greenish, watery stools a day.

April 7, 1911. Baby much improved. Wassermann still positive.

CASE III. J. S., white, female, nine and three-quarter years; only child, there having been five still-borns previous to this one. At nine years adenoids were removed. Patient had been deaf nine months previous to operation. Mother thought there had been some improvement for three months following the operation. This patient was seen in the out-patient department on January 20, 1911, at the Touro Infirmary. She first entered the service of Dr. Blum, who treated her for a parenchymatous keratitis. She was referred to Dr. Weil because of deafness. He found no adenoids remaining, and only moderate tonsils. He believed there was a probable syphilitic nerve deafness. I saw her with him on January 31st. A positive Wassermann was obtained in father, mother, and child. It was difficult to secure her blood for the Wassermann from her veins because of their small size.

Physical examination was negative aside from the condition already mentioned, and her weight, 56¼ pounds, and her height, 49 inches, were both below the average.

February 14th. She was given 0.3 gm. salvarsan, intravenously.

February 22d. Mother believed patient could hear better.

March 7th. Mother believed hearing was stationary, but that speech was better. Weight 58 pounds.

March 22d. Wassermann positive. Patient is much brighter and seems to understand more readily from the movements of her mother's lips what is being said.

April 6th. Hearing stationary; speech stationary. Improvement in general condition. Weight 60½ pounds. Wassermann still positive.

In Case I. the mercury was given because of the persistence of the Wassermann. However, as there were only seven applications of the mercury, I do not believe it had any influence in producing the negative Wassermann.

In Case II. it is probable that not sufficient time has elapsed since the administration of salvarsan for definite results. It might

be said, however, that there has been marked improvement in the baby.

In Case III. the result has been negative as with other observers in cases of deafness. The Wassermann is still positive, probably because not sufficient time has elapsed since injection. In this case, because of her age and size, it was believed that the intravenous method should be used, notwithstanding the difficulty in obtaining the blood for the Wassermann from the veins. An attempt was made to inject salvarsan through the median basilic in the left arm without exposing the vein. A small amount was injected in this way, but it was also noticed that there was some escaping into the surrounding tissue. Believing that the vein was too small, the median basilic of the right arm was exposed, and with the same needle, which was very small, it was impossible to inject that vein. This was, of course, done under general anesthesia because of the psychic disturbance of the child during the attempt on the left arm. Not being successful in injecting the median basilic veins, the patient was examined for larger veins and the internal saphenous vein over the inner malleolus seemed satisfactory. It was exposed, and the patient given the remaining solution. The after treatment in this case was the same as in Cases I. and II. and she was allowed to return home two days after the injection. There were no complications, and the left arm, where the fluid had escaped into the surrounding tissue at the site of injection, gave no trouble.

In conclusion the author believes that:

1. The best method of treatment of the luetic infant is through the mother's milk.

2. If it then becomes necessary for further treatment, either mercury or injecting the baby with salvarsan may be resorted to, preferably the former.

3. The treatment of the fetus through the mother is at present unsatisfactory.

4. The intravenous route is the method of choice for larger children.

5. When the veins are small they should be exposed for injection.

6. When the veins are too small the intravenous method is impracticable.

7. In injecting small children, and when it is necessary to expose the vein, a general anesthetic should be administered.

PROPHYLAXIS DURING CHILDHOOD.*

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New York.

If there is any one fact standing out more strongly than another in the trend of present-day medicine, it is a recognition on the part of the profession that, great and efficient though our efforts may be in resisting actual disease, our greatest measure of usefulness is along preventive lines.

The acme of results should be attained with our preventive measures when efficiently applied to infants and young children. Here we are dealing with the unperverted organism. Excepting the rarest occasions, we have a normal heart and blood vessels, and the stomach, liver and kidneys unaffected by vicious habits of eating and drinking. Neither has the nervous system been shattered by business perplexities, nor excess in venery. The ordinary adult is a patched garment—at best his habits of living are more or less vicious and fixed, and the best we can do for him reflects little credit on either the patient or ourselves.

It is a well-established fact that resistance to disease is largely proportionate to the condition of nutrition. Instead of allowing our children and those for whom we should be professionally responsible to largely choose their own methods of existence, and thereby fail to attain their maximum possibilities, why would it not be vastly more profitable to bend all our energies toward keeping them as near as possible to the *one hundred per cent. of resistance?*

This would mean on the part of the medical adviser that his first and almost his last and only thought toward his patient should be to regard his hygiene and nutrition. Almost, at least, forget his medicine. True, it is much easier to write one or more medical prescriptions for the ailing child; but in a large percentage of cases a little investigation will reveal an error in hygiene or diet responsible as the cause. A case in point: Recently a four-months-old breast-fed infant was seen, who was pale and flabby. To make him stronger and relieve the anemia, he was getting gtt. i of the tr. of the chloride of iron before each nursing. He had had this about one month and still failed to thrive. Investigation showed he was getting about *one* ounce of good milk at each feeding when he should have had three or four. Four bottle

* Read at the December Meeting of the Bellevue Hospital Alumni Society.

feedings a day, supplementing the breast, resulted in a gain of eight to ten ounces each week.

There is a lamentable failure on the part of the profession to drive home to the parents of children the importance of the two basic principles of life, good hygiene and proper diet. A recent bulletin reports 732,538 deaths in the registration area of the United States for 1909. The registration area includes only 55.3 per cent. of the whole estimated population, so the above number of deaths represents only a little over half the whole number. Nearly 20 per cent. of the above number were under one year of age and 27 per cent. (nearly 200,000) under five. Professor Irving Fisher, of Yale, maintains that 47 per cent. of the deaths under one year and 67 per cent. between two and eight years should be preventable.

My own experience shows that at least 75 per cent. of all children under twelve years of age are more or less below par of resistance because they are badly fed and cared for, and are consequently more liable to disease.

While I say the medical profession does not sufficiently appreciate the importance of early preventive advice, there is another factor, legalized here and elsewhere, that to my mind explains much of the terrible mortality among the children of the poor. I refer to the practice of midwifery. In New York City, 1905-1909 inclusive, statistics show that 43 per cent. of all births reported were attended by the midwife.

Medical laws here are such that practically under all conditions, obstetrics excepted, only educated physicians can attend. In the birth of the child not only the mother's future usefulness is involved but her life. As to the child, the kind of advice given largely determines whether he is to have a chance for his life and development. If individuals are so poor they cannot pay for the services of a *qualified physician*, the municipality or State should see that they have either institutional or home service. If my claim amounts to anything at all, there is no time in the life of either the mother or child where money and effort expended would give a greater return.

Here in New York and in other cities a medical corps is paid to look after the sick poor in summer; the schools are inspected the year round. Why not another corps of physicians to whom the pregnant poor woman may apply for proper assistance? This when she cannot or does not care to gain entrance to an insti-

tution. The initiation of this change need not interfere with the employment of the women who now act as midwives. Let them still be employed to carry out the advice of the physicians.

The future of our race is largely to be determined by the kind of children we develop. While in one generation a race of giants in stature, nervous energy and mental attainments may not be produced from pigmies, still the kind of advice received for the child only too often determines the difference between the body and mind of the robust adult and the shriveled, cramped and crabbed condition of the ill-developed; yes, the failure of the above vast army to even exist.

The average physician has two generations, many have three or more, over which he may spread his usefulness; and though we may be told "heredity is beyond the physician's power to alter," I maintain much can be done to negative adverse factors and thus elevate and strengthen the finished product.

The great, glaring things in surgery, in medicine, in economics, are readily appreciated and adopted and our patients promptly receive their advantages; the so-called little every-day details in the management of the children, these are too often left to the whims of the young father and mother, as influenced by the "old folk lore" of the grandmother and maiden aunt. These little insignificant daily details are of such importance that they overbalance, in the aggregate, all the more weighty problems in child development and largely dictate the future of the adult, morally, physically and mentally.

The object of this paper will be to consider some of the most important details in the care of children and seek to ascertain whereby we may exert preventive influences.

Discipline is largely the key to disposition, nutrition and development.

In quite a majority of well-to-do families, as well as in the homes of the poor, there is no concerted, well-sustained, intelligent attempt made to influence either the disposition or activities of the child. Slight indulgences lead to greater ones; advice is given in parenthesis—it can be accepted or disregarded. Occasional spasmodic attempts may be made to influence activities along proper channels, but in the end the child wins.

A child cries and at once he is taken up and walked, rocked or fed, this in violation of time or propriety; then in short order he cries *to be* walked, rocked or fed, and he is regularly gratified.

The infant from his earliest days dictates the policy of his rearing. When he is older and can manifest his desires by word or action, is it strange if he still dictates his indulgences and activities? What at first were simple notions or impressions, soon afterward become fixed habits. The character of the individual is building and wilfulness and selfishness are the corner-stones.

Again as the child becomes older misconduct is reprov'd and, in the same breath, inability on the part of the parent to control is expressed: "Johnnie is a bad boy and I cannot make him mind," an implied weakness on the part of the parent, sure to be discovered by the average child.

When we reflect, is it remarkable we have so many distorted, unhappy, narrow, unbalanced, selfish adults? I am not a pessimist. I simply would have more reason for optimism. Every day's experience brings with it glaring defects of parental responsibilities. On whom should the correction of these defects rest most properly? Certainly not on the grandmother nor the minister. The doctor, overburdened though he be, it seems to me is the best and natural recipient of the burden.

This is distinctly an age of prophylaxis and if we would round out our protection in the greatest measure, we must begin at the beginning. If not before the birth of the child, as soon after as possible, both mother and father should be impressed with the advantages of *beginning right*. They should be taught the child comes to them devoid of habits of all description and equally susceptible to either commendable or objectionable impressions; that these impressions early develop into habits, either good or bad.

Both parents should be brought to feel the necessity of surrounding their offspring with such influences as will protect him from the endless amount of gratuitous advice they will receive for him.

They should be shown how much more valuable the physician can be to them, if consulted *before* initiating any new scheme of management; how he can so often protect and prevent; but if trouble has been allowed to develop, his advice is much less efficient and valuable.

Parents should be shown it is no deprivation to keep from a child that which he has never enjoyed or experienced, and that a great many perfectly prudent indulgences for the adult are not only wrong but absolutely ruinous for the child.

Too much advice cannot be given the parents as to what constitutes kindness on their part toward their child; because the child apparently *wants* or *does not want* any particular thing is no reason why his wish should be gratified. It is the parents' first duty to become informed as to what is right, as well as what is *wrong* and then let nothing interfere with their duty.

We should show them that the greatest unkindness on the part of parents is to gratify a child in something they know is not for his best interests. This because the child seeks the gratification or wishes to avoid the obligation.

As the child grows older constant emphasis should be placed on the fact that he does the thing advised because father or mother knows best. This one thought, emphasized discreetly, will influence the whole future of the child and that in ways we at first would not expect. It will inspire respect for the opinion and requests of all who are older and entitled to respect. It will prove a potent factor along nutritional lines, teaching the child to eat what is placed before him and avoiding those miserable and perverting expressions, "I don't like this" and "I like that."

The greatest happiness in life is brought about by regarding first the interests of others; the unselfish adult is the product of self-denial and proper respect for the wishes and opinions of others during childhood. These qualities have their beginning in the earliest weeks of infancy, in a well-defined appreciation on the part of the parents as to what constitutes parental responsibilities. Conveniences should never be consulted in advising for or caring for the child. Order and regularity as well as exactness should be observed in all requirements. The first impression made on the child is that of satisfaction at *regular* intervals; then comes appreciation and the recognition of the parent as the source of the satisfaction. Continued appreciation buds into love and confidence, and these attributes, properly fostered throughout childhood, blossom into a well-rounded, unselfish and appreciative disposition.

The fact that every child should have a bath each day need not be told the average mother. Certain details of the bath, in order that the best results be attained, may well be advised.

The very young child may be bathed as regards night or morning, largely at the convenience of the mother. The runabout or the older child should have his bath just before being put in bed. Special care should always be advised as to thoroughly drying the

hair. Neglect in this detail is a very frequent cause of "cold in the head," especially when the child is put, as he should be, in a cool, well-ventilated room to sleep.

Left to her own initiative or to the advice of her relatives and friends, the mother will almost invariably over-clothe the child during his first months, this being a prominent cause of discomfort and fretfulness, the restlessness of course being interpreted as hunger. Our endeavor should be to have the child wrapped so he is comfortable, telling the mother her child is subjected to about the same impressions as she herself.

With older children, in cool weather, the extremities are frequently left without proper protection; this I feel cannot be too severely criticised and should always receive our condemnation.

Children, like plants, are hardy and resistant only when they have plenty of fresh air and sunshine. In the country, where there is little dust they can well be allowed outdoors practically all day. In the city, where the surface air is reeking with all manner of filth and microörganisms we may well advise that it is highly imprudent to have the children in the street to any extent. Still they must have fresh air and sunshine, and they can have it in a generous degree, if we will have them placed in a sunny room with windows wide open. They can here, dressed comfortably, be *outdoors* all day without going in the street at all; here they get all that is good with very little of the contaminating influences of the microbe-laden air of the street. The above applies to the very young and older children. The baby can here sleep the day out in his carriage in the open, a hot-water bag at his feet if necessary. The runabout is best protected by being placed in an "exercise pen," an arrangement four to six feet square, on legs ten to twelve inches high, and with sides built of slats or rods three feet high. This device is one of the most valuable that can be advised for the protection of young runabouts from draughts, falls and mischief generally.

Very *few* children have to be urged to physical exertion; very *many* should have their hours and methods of physical and mental exercise censored, if benefit is to result. In a large number of patients, it is just as essential to prescribe the amount of physical exercise to be taken, as nutrition to be consumed. Every child under six years, many under eight or nine, should be obliged to lie down one hour, better two, after the midday meal.

Mental stimulation in all children under seven years is injurious to both physical and mental development. The baby under one year, as Rachford expresses it, should "simply vegetate." During the next six years, at least, there should be only natural activities of mind and body encouraged.

During the first six or more years, only the general *physical* well-being should be considered, the mind being allowed to pursue its own trend without any urging.

When we come to school years the tasks should be most carefully supervised, and if at any time the general development of the child is threatened, schooling should either be curtailed or cut out. An educated invalid is a sorry production—a continual reminder of what he might have been; a contrast to that he should have been.

Feeding and nutrition should be synonymous, but unfortunately for the great mass of humanity only the former is really considered.

Nutrition is the keystone of our structure.

Much of our opportunity for advising for the child, and necessarily our efficiency, will depend on the impressions we leave with the parents during the early weeks of infancy. If we assume an indifferent attitude and leave the impression that most any advice will suffice, we pave the way for the parents to accept any advice and follow that course which is most convenient. Again, if we give definite advice for definite periods, we increase our own opportunities and safeguard our patients.

Breast-feeding.—Along nutritional lines, the pediatricist's first great prophylactic opportunity is in encouraging breast-feeding.

Every endeavor should be made to make this possible, if only for three or four months. Definite advice for the care of the nipple, both *before* and *after* the birth of the child, has much to do with favoring successful lactation. The mother's diet, drink, and bowel functions, as well as her activities and rest, should all receive appropriate consideration in the nursing problem.

The importance of the early nutrition given the baby, whether from the breast or the bottle, is so momentous that it has long seemed to the writer that the obstetrician should either better acquaint himself with the subject of infant feeding or where practical, place the advice for the baby's nutrition and care in the hands of the pediatricist from the time of birth. The first three or four *weeks* of the baby's existence are more important

from a nutritional point of view than an equal number of *months* after.

Start the baby right and the difficult after problems are largely eliminated.

Time forbids that I take up the many questions to be considered as influencing nutrition, when on the breast or the bottle. This one statement, though, I do wish to make: too frequent feeding is one of the most potent causes of malnutrition and sickness.

The best breast milk, the most carefully prepared bottle nutrition, will very often fail to nourish if given at too short intervals. Three-hour feeding intervals during the day should practically without exception be substituted for the proverbial two hours, or any time the child desires.

The infant's stomach requires an interval of repose, just as the adult's, and if it does not get it we invite trouble.

From the beginning of the runabout period and after, well up to adult physique, we have the stage of excessive bodily activity. The demands of this stage as far as nutrition for activity is concerned, will be met at any cost to the organism. If we are not careful proper growth and the resistance of the individual will suffer.

We must so balance our nutrition that we have an abundance of carbohydrates and hydrocarbons for heat and activity, and more important still, proteids for cell growth. If starch, sugar and fats are deficient, the proteids will be deflected from their proper channel and cell growth will suffer.

The robust child demands, above all else, a high proteid diet; he must have an abundance of nitrogen or prove deficient in his continued development—flabby muscles, unstable nerves, weakened osseous system, poor resistance generally.

These statements regarding growth and activity indicate our course in providing nutrition: meat, eggs, milk and high proteid cereals, including legumes and possibly soy beans; and, to balance the diet, selected vegetables and fruits. Our diet schedule should include not only the particular food advised, but its preparation and the intervals of giving. As far as possible, and the exceptions are very rare when we cannot, we should arrange our diet so that the bowel functions are regulated without recourse to laxatives. Cultivation of a regular habit is of great importance in this function.

126 West 81st Street.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE.—SECTION ON PEDIATRICS.

Stated Meeting, Held October 6, 1911.

WILLIAM M. POLK, M.D., CHAIRMAN.

THE INFLUENCE OF MILK-STATION WORK ON THE REDUCTION OF INFANT MORTALITY.

DR. GODFREY R. PISEK presented this paper, which showed the result of the campaign of the past summer waged against infant mortality in New York City through the influence of milk stations. For the first time in the history of the city the influence of the milk stations had been sufficiently comprehensive to show definite results. The results were brought about through co-operation between all public and private agencies working along these lines. Cosmopolitan New York, with its 125,000 new-born babies every year, presents a much more difficult problem in this field of work than other cities, and it was felt that if success could be demonstrated here, the movement would become state-wide and the appalling mortality revealed in the last census correspondingly reduced. The committee for the reduction of infant mortality raised a sufficient amount of money through voluntary contributions to establish thirty-one milk depots and assisted in securing maintenance for fifteen more stations under the control of the New York Department of Health. Thus there were at the beginning of the summer seventy-nine stations, including those of the Straus laboratories, the diet kitchen, the babies' dairies, and one station each belonging to the nurses' settlement and the Morningside Milk Dispensary. The object of the association of all these agencies was to eliminate wasted effort by confining the activities of each organization to definite territory. On July 1st there were 5,932 babies enrolled, by the end

of the month there were 9,888, and at the end of August the enrolment was 11,702. Contrary to all expectations, the enrolment continued to increase daily, in spite of the fact that the warm weather was well over. An idea of the magnitude of the work might be obtained from the fact that 74,000 quarts of milk were dispensed weekly. The milk station is no longer primarily designed for the distribution of milk; the education of the mother has come to the front and the doctor and the nurse are the more important factors. The intimate contact of the visiting nurse with the mother allows her to teach the mother how to modify milk in her own home according to the doctor's instructions presented according to the individual child's needs. In these stations the whole milk, with simple dilutions with gruel and the addition of ordinary granulated sugar, was found to serve the purpose so well that this became the rule. The milk used was an excellent raw product and was preserved from deterioration in the home by inexpensive home-made refrigerators. The mothers were taught the value of breast milk, and no children were removed from the breast unless it was absolutely necessary. The mothers were taught to recognize the danger signals of summer diarrhea and the necessity of immediate action, and were also instructed in the prenatal care of babies. Thus the writer believed that many more lives were saved than statistics revealed, because of the lessened morbidity and the fact that the children were strengthened to resist the encroachment of intercurrent maladies. Knowing that the work here was being watched by cities all over the country, the committee decided to issue a weekly bulletin, giving comparative statistics in infant mortality in different cities. Of 355 health officers communicated with, seventy-nine expressed willingness to give the statistics desired, while the others stated that their vital statistics were so imperfect that they would mean but little, thus showing the need for a national and state clearing-house of information relating to infant mortality. The committee will continue its agitation on the subject of standardizing vital statistics with the hope that in another year comparative information may be made available.

That the work done was effective in reducing the death rate, in spite of extreme hot weather and drouth, is proven by a survey of the following figures: The number of deaths from all causes

during the first nine months of this year was 11,733, while during the corresponding period of 1910 the death rate reached 12,920, or, in other words, a rate of 124.6 per thousand infants this year against 142.3 for 1910, a decrease of 17.7 per thousand infants. Even if this rate is not lowered during the remainder of the year there will be a saving of 1,640 babies during the year. During the months of June, July, August and September of this year there have been 1,244 less deaths than during the same time last year. There is a decrease of 1,417 deaths from the average for these four months during the past five years. In the Borough of Manhattan, from January to June, there was an increase in infant mortality of 28 per cent. over last year, but during the month of June, after the milk campaign began, there was a decrease of 50 per cent. over last year. During July, when there was a spell of exceptionally hot weather, there was a decrease of 60 per cent. over last year. For the whole summer there has been a decrease in the death rate of 41 per cent. A comparison of New York results with those of other cities, where figures are obtainable, seems to show that the diminished mortality is in direct relation to effective measures directed against the deaths of infants. These figures are especially striking when compared with those from London, where, owing to hot weather, there was a sudden rise in the infant mortality. At the end of July the deaths from enteritis and diarrhea in children under two years of age rose from 173 to 304, and toward the end of August to 635 per 1,000.

To further prove the effectiveness of the campaign, comparative studies were made in different districts of the city. For instance, two districts equally congested, one having a milk station and one having none, were compared. In the district having the milk station, in 1910 there were 419 deaths; in 1911 there were 298, a gain over last year of 29 per cent. In the other district uninfluenced by milk stations there were in 1910 302 deaths and in 1911 333, or an increase of 9 per cent.

Dr. Pisek urged the profession to lend their support to the Commissioner of Health, who would ask for an appropriation sufficiently large to enable them to carry on this work throughout the year. If the work was kept up there would be less need of corrective work at the school age, fewer inmates of our asylums and institutions, and a lessened burden on the community.

THE PRINCIPLES OF THE REDUCTION OF INFANT MORTALITY, WITH
SUGGESTIONS FOR FUTURE WORK.

DR. S. JOSEPHINE BAKER, Director of Child Hygiene of the Department of Health, read this paper, in which she stated that there was no other public health problem of the times upon which they had so much absolute knowledge as to the answer with the possible exception of tuberculosis, as upon that of the reduction of infant mortality. In common with tuberculosis, infant mortality was an infinitely complex problem. Some of its many factors may be classed as sanitary, hygienic, social, economic, humanitarian, philanthropic and individualistic. Until we realize that every factor must be reckoned with, every maladjustment adjusted, every beneficent feature used to its utmost worth, and every undesirable one eliminated, we could not do more than touch the high places, congratulating ourselves one year upon achievement and deploring our lack of success the next. They must concede that no one line of endeavor, however vigorously worked out, would permanently lower the infant death rate. No greater danger could threaten their hope of ultimate victory than that of assuming that the total reduction in the death rate in any one year was wholly due to the specific efforts made during that year. A study of the statistical returns of the past decade, and, in fact, a careful analysis of the situation in the last record-breaking summer, would reveal the inexplicable truth that the infant death rate of certain years is lower than that of others, irrespective of any efforts made to reduce it. The keeping of babies well is not a mathematical proposition, but from our present knowledge we can state one fundamental principle with certainty—that prevention of disease must be our aim, and education our main weapon. That this theory has a basis may be proven by the fact that this reduction in infant mortality has been constant over the entire country, both in rural and urban districts, notwithstanding the periods of heat, which have been more protracted and intense than for many previous years.

The broad force which must be studied and applied to the fullest extent before we can definitely and permanently lower the death rate is the awakening of public opinion. The people must be stimulated to demand that all civic forces be so adjusted and coördinated that the babies may be allowed to live, instead of forced into illness and doomed to death. Public opinion can

insist upon better housing conditions with sunlight and fresh air in living apartments, upon clean streets, adequate water supply, increased park space, playgrounds, recreation centres, and the use of the docks for the breezes from our water fronts. It can place in the hands of our Health Department sufficient funds to carry out a widespread campaign for the instruction of mothers in the care of infants, and the provision of a sufficient number of milk stations to meet the needs of our infant population, and then with all its forces uphold the wise expenditure of these funds, with intelligent criticism of methods and interest in results.

Specifically, the principles for the reduction of infant mortality include: (1) The study of the problem of the institution baby. During this year up to October 1st, 42 per cent. of all deaths of babies under one year in the Borough of Manhattan have occurred in institutions, the foundling babies furnishing the greater proportion. (2) A supply of milk safe for infant feeding at a price within the reach of a majority of our people. The relative value of raw and pasteurized milk for infant feeding still seems to be an open question. Purification cannot take the place of purity, but the matter is economic, and purity seems beyond our reach at the price we can pay. (3) The broadening of courses in pediatrics in our medical colleges, so that they may assume the importance that is their due and assure to every physician a thorough knowledge of infant hygiene and care. (4) The interest of social students and workers, and of philanthropists in meeting individual family needs and adjusting economic conditions. (5) The instruction of each mother in the necessity of nursing her baby, and if that is impossible, then in the proper substitute feeding and how she may take advantage of and apply the essential methods of hygienic baby care. (6) A right understanding of the immediate causes of infant mortality.

These principles have been applied in part and a study of the thirty-year period, from 1880 to 1910, demonstrating the changes in infant mortality in New York City, is of interest. In 1880 the death rate from contagious diseases was 15.72 per thousand, in 1910, 4.07 per thousand, a reduction of 70 per cent. In 1880 the death rate from diarrheal diseases was 62.74, and in 1910, 39.71 per thousand, a reduction of 37 per cent. The death rate from respiratory diseases, 43.70 per thousand in 1880; in 1910, 27.20, a reduction of 38 per cent. The death rate from con-

genital debility in 1880 was 47.57, and in 1910, 45.68 per thousand, a reduction of 4 per cent. The total death rate from all causes was 288.9 in 1880, against 133.9 per thousand in 1910, a reduction of 54 per cent. The number of deaths from diarrheal diseases for the year up to October 1st was 3,227, or a death rate of 34.2 per thousand infants, as against 4,011 deaths, or a rate of 44.2 per thousand infants during 1910. We have never before had such a systematic campaign or such a low death rate in this city. In the eighty-four milk stations, having under their control 11,644 babies, exclusive of those who were dropped from the rolls by reason of removal, refusal to obey rules and for minor reasons, 294 deaths occurred, or a total of 2.5 per cent. The nurses of the Division of Child Hygiene of the Department of Health had 16,987 babies under one year of age under control from May 1st to September 10th. Each baby was visited at least once in ten days, and if ill or delicate, more frequent visits were made. One physician was assigned to each group of two or three nurses, and held daily consultations with them regarding the babies visited. All sick babies were cared for by physicians and a record kept on file in each borough office.

There was a mortality rate of 1.4 per cent. of the babies under control. The cost of this work amounted to about 50 per cent. a month for each baby. There were conferences for mothers and little mothers' leagues to teach older girls how to keep babies well.

Dr. Baker said that she was convinced that they must put into effect a more comprehensive programme for future achievement, and suggested the following as an outline: (1) A comprehensive and widespread campaign of educational publicity—one that would reach both the public and the individual mothers. (2) A study of the decrease that has already taken place in the infant death rate shows that this decrease has occurred in the three groups of contagious, diarrheal and respiratory diseases, in the order given. The group classed as congenital debility shows practically no decline. Here we have one-third of our infant deaths occurring within the first two weeks of life and due almost entirely to prenatal influences. It is evident that it is to this latter class that we must direct our attention if we would still lower appreciably the total number of infant deaths. Here they needed the aid of the obstetrician; his control should not be limited to the confinement and the few succeeding weeks, but the mother

should place herself under his care and follow his directions during the entire period of pregnancy. To this end, they should have (a) proper control of midwives, who in this city care for 40 per cent. of the births; (b) classes for and supervision of pregnant women, using all means to provide them with essential instruction and the means of applying it; (c) a form of insurance that will provide a stated payment for women for a period of at least one month before and one month after confinement, thus obviating the necessity for physical labor during this time; (d) the co-operation of philanthropic forces, relief agencies and social workers to provide proper food, hygienic surroundings and freedom from anxiety for the mother during the prenatal period of the child's life. The Socialist would say that the crux of the whole matter was a living wage for the wage-earner of the family. To a great extent this is true, but the question of the illegitimate still remains.

2. The question of institution care *versus* the placing-out system for foundling babies should be practically worked out. The death rate in these institutions is abnormally high and all our studies seem to show that this rate is greatly reduced where the infants are boarded out and receive the individual attention that each baby needs. Foundling institutions should serve as clearing houses only, furnishing hospital care for sick babies and immediately placing all others out in properly supervised homes.

3. It is essential that we recognize that infant mortality is a year-round proposition. The time to save the baby is before it gets sick and not afterward. Our educational campaign should be carried on in the winter as well as in the summer and our vigilance should never relax. Until this lesson is learned and provision made for persistent effort throughout the entire year we can never be wholly successful. Our present policy is short-sighted and expensive and utterly at variance with our present knowledge of preventive medicine.

DISCUSSION.

ERNEST J. LEDERLE, PH.D., Commissioner of Health, said that the Department of Health had asked the Board of Estimate for sufficient funds to carry on under permanent municipal auspices the work of the seventy milk stations that had been established in the City of New York, partly by the city and partly by the

New York Milk Committee and other private organizations. If the people of the city thought this work worth while, and if they believed that the Board of Health is the proper agency for this work, the Board of Health asked that it be supported by the people, and especially the medical profession, in obtaining from the Board of Estimate sufficient funds to carry on the work properly.

In his discussion Dr. Lederle confined himself to the question of the control of the milk supply of the city. They had seen remarkable changes in the last thirty years in the control of the milk supply by the municipal authorities, especially by the Board of Health. Twenty-five or thirty years ago the Department of Health was confronted with what was considered a very grave matter, the adulteration of milk by the removal of the cream, the addition of water, or both. About twelve years ago certain physicians became interested in infant feeding and it was found that there were often more important features to be considered in the milk supply that was to be used for infants and the chief one was that the milk should be clean. If they found unclean milk, that meant injury to the infant. It was known that certain diseases were transmitted to infants as well as to adults through the agency of milk. This pointed to a new field to deal with in considering the milk supply. In 1902 and 1903 the Department of Health took upon itself the task of making bacteriologic examinations to learn the condition of uncleanness of the milk of the city, even going to the farms and creameries for this purpose. A system of inspection was established. Great results had been accomplished through this system of milk inspection at the farms. At the present day, however, they found that they would not supply them with the quality of milk demanded, especially that required for infant feeding.

A few years ago there occurred a serious outbreak of typhoid fever on the west side of the city which was traced to milk. During the early part of last year another serious outbreak occurred in the upper west side of the city which was traced to milk. It was found that the milk had been contaminated by a typhoid carrier. As a result of the investigations made at that time recommendations were made by the Department of Health that all the milk used for drinking purposes should be pasteurized. They expected to see good results from this recommendation during the coming year.

It was decided that it was impossible for the City of New York to use 1,600,000 quarts of milk a day that had been brought to the standard which would be proper for infant feeding; it was not, in fact, necessary that the whole supply of 1,600,000 quarts should be brought to this standard; it was not economic, nor was it proper to raise the cost of such milk to a prohibitive degree. Therefore the Department of Health had decided to adopt an official grading of the city's milk supply into three classes as described in detail on a chart to which the commissioner referred. Grade A for infants and children; Grade B for adults; Grade C for cooking.

DR. EVANS, Ex-Commissioner of Health, Chicago, Ill., said that one-third of the people in Chicago, and he presumed it was the same in New York, died from what was termed "bad air" diseases; one-third died from infant diseases; while the remaining one-third died from all the other things combined. Therefore, it was easy to see how important it was that this field should be cleared up. From an economic standpoint it was worth while. There was nothing in dead or neglected babies. In some communities it was very difficult to get people to understand the importance of this work. He said he came from the State of Mississippi, where there lived an old man who had not been as well to do as others in that community. He had a daughter named Sal, who always went bare-footed. Once she was standing by the fire bare-footed and with her eyes shut. Her mother said: "Sal, Sal, you got one bare-foot on a red-hot coal." Sal replied: "Which foot, ma?" Something like that was the attitude of the community toward a sick and dying child. Change that attitude and determine to do something.

DR. PHILIP VAN INGEN said there were one or two things that he would like to emphasize. He had made a study of the baby deaths in the borough of Manhattan for the last three years. In making comparisons up to the first of October he found that in the borough of Manhattan 33 per cent. of the decrease in infant mortality had occurred in 144 blocks immediately surrounding the eleven milk stations. He had not yet obtained figures for the rest. Six were on the lower East Side; four on the lower West Side, and one was on the upper West Side. Thirty-three per cent. of the total decrease in infant mortality in Manhattan occurred in an average of thirteen blocks surrounding these milk stations.

Another interesting thing was that the reduction had taken place since June 1st. In other words, since the work was begun by the Board of Health and other agencies, infant mortality had been on the decrease. There had been a decrease of 882 deaths among babies in four months in the Borough of Manhattan alone. There had been a total decrease of 1,181 in the Greater City of New York. Manhattan and Brooklyn showed a decrease of 1,187, or six more than the total for the Greater City of New York.

It seemed to Dr. Van Ingen that when they considered the infant mortality in those 144 blocks since the founding of the milk stations, and compared it with the previous years or the average for the two previous years—and found a diminution of 29 per cent—it showed that there was something at work.

As Dr. Baker had said, the key-note in the work of the milk stations was prevention. Their chief efforts were not directed toward the curing of sick babies, but keeping them well. The nurses went from house to house and talked with the mothers regarding their babies, urging them to make efforts to keep them well. This was an economical way of handling the proposition.

DR. HENRY DWIGHT CHAPIN said there was one thing he would like in particular to emphasize, the high mortality among infants in institutions. They would never reduce the mortality among a certain class of babies as long as they were handled in institutions. A large number of decrepit and underfed babies were not properly cared for at home. They drifted from one hospital, from one dispensary, from one asylum to another, and eventually they died. Such a class of cases should be boarded out. Ten years ago he recognized that they had a problem which required a different method of treatment to solve. So he chose a certain district in the country near Morristown, N. J., where he had a doctor and a nurse on salary and babies were sent there to be boarded out. These were the atrophic, badly-nourished infants, and a large proportion of them had been saved. It was better to permanently help these babies than to only temporarily tide them over. These babies swelled the death rate when treated in institutions. Many would be saved if boarded out under proper conditions. The City of New York should have districts near New York where such babies could be boarded out in small houses and receive a mother's care under the over-

sight of a doctor and nurse especially trained to handle these infants. This would greatly reduce the death rate in this class of cases.

DR. L. EMMETT HOLT was glad to hear Dr. Baker emphasize the fact that there was a high infant mortality all the year round. It was often forgotten that 25 per cent. of all infant deaths occurred during the first month of life. These early deaths were due to congenital illness, prematurity, accidents of birth, etc., and were not influenced by the season of the year. He thought the prevention of infant mortality would be begun, as had already been stated, by caring for the mother before the baby was born. One should carefully scrutinize the work of midwives; we should follow up the newly born children in the home by the visiting nurse before they became sick.

In the past one of the most striking things to be noted in infant mortality was the small number of deaths from gastrointestinal diseases among the well-to-do in contrast to what was seen among the poor. It was in part perhaps due to the difference in the milk supply, but largely to the care, instruction, and attention which well-to-do classes were able to avail themselves of. Until very recent times poor people had little opportunity to know what was proper in the care and feeding of children. Mothers often brought children to dispensaries after they had been sick a week, the child's food during this time not having been changed. We had now begun to work at the right end of this problem. Infant mortality was to be reduced by methods of prevention, not therapeutics. Of all methods of prevention, education took the first place. The agencies which had coöperated so well during the past season were all deserving of heartiest praise. It was a splendid example of what could be accomplished in this way.

Dr. Holt strongly endorsed the application made by the Commissioner of Health to have the work now going on continued throughout the year. It was not a question of the number of bacteria in the milk, but of the intelligent care of the baby from its birth.

DR. WILLIAM P. NORTHRUP had only one thing to add, the importance of not treating these children in hospitals; his experience in attempting to cure them in hospitals was not encouraging. He said he was much interested in the enter-

prise of Dr. Chapin. The follow-up nurse was of great value; she followed up these mothers who brought their babies to the Out-door Department and gave them instructions; the instructions were the most important part of her functions. Any nurse who came from an institution or from a clinic, going among the people with the endorsement of a college, was "some person" and these women would listen to her. Many times a doctor would give definite and careful instructions and the woman would say "Yes." She would go to another dispensary, get a bottle and definite instructions and say "Yes." Then she would go to another dispensary, get her bottle and instructions and again say "Yes." So she would go to three different dispensaries. At last it developed that she did not understand English. If, however, the nurse dropped in on them at their homes and asked what they were doing with the milk, they would be surprised to see her, but they would finally welcome her. The nurse went back again and the mothers believed in her. Dr. Northrup felt convinced that this matter of education was the most important part of this subject. The doctor could not go far on the road of instruction without the follow-up nurse.

DR. JACOBI said that what he could say would be a repetition of what had already been stated. He understood that this was a "milk" and not a "mortality" evening. They should not forget that a large number of cases died before the child was one week or one month old. It was not a question, therefore, of milk stations exclusively, it was a question of nursing from the very first. What could be done for the newly born baby should be done by the mother if she were capable, but the mothers themselves were not properly cared for. As a rule, of 100 women 95 were able to nurse their babies if properly fed and instructed. These did not want milk stations, they had milk stations in their own breasts. The mother should be cared for before the baby was born and particularly afterward. There was no place in New York where these poor women could go to rest up for six or eight weeks. There were now no more than 1,000 beds for any class of convalescents in the City of New York; we should have 10,000 beds. A number of private persons have begun to study this question to learn what to do with these women after confinement. Now they are treated like acute patients in the hospitals, and were discharged as soon as the main symptoms of

the disease had disappeared. Before considering what we should do for the babies, we should first do something for the women. If private persons would not do it, the community *must* do it. If a baby died, it was somebody's fault; if the baby died because of bad air or bad food, it was due to the community; the community should hold itself responsible. It was said that this was socialism or the claims of socialists; Dr. Jacobi said if this was so, the sooner they had it the better for the mothers and for the babies.

Dr. Jacobi referred to the housing of these people. They must have good, pure air, not only must they have rest, good food, but they must get away from the foul air of the tenements. As an example, you could not succeed in treating tuberculous patients unless one did that; the same with babies. They could not thrive in a badly ventilated, congested room. They would often die because of lack of fresh air and excess of heat. They would die as people died from heat stroke. Heat stroke and bad air should be avoided. There should be better housing for the people, for the whole people, rich and poor. He had been in large Fifth Avenue mansions where the library and sitting-room extended the whole width of the house, yet the babies were on the top floor, where there was hardly a breath of air. There should be good housing for the poor as for the rich; if not, these babies will die.

METABOLISM IN RHEUMATISM: FOOD FACTORS IN RHEUMATISM:

MANAGEMENT OF VALVULAR LESIONS.

DR. JOSEPH E. WINTERS said that he was absolutely convinced of the chemical etiology and chemical pathology of rheumatism. This contention was based on the products of protein metabolism. The irritant effects of these products existed when they were not neutralized by sufficient basic constituents in the food. The acid products of protein metabolism, when not neutralized by sufficient basic constituents, resulted in all the manifestations of rheumatism. Salicylic acid destroyed the rheumatic element because it united with the acid. This was an unalterable chemical law. The end product of proteid metabolism was invariably acid; the acid radical was always constant. Acids were the foes of the body and they were distinctive

of the disease, rheumatism. The functional integrity of the enzymes determined the susceptibility to pathogenic bacteria!

Rheumatism was the only disease that could exist for weeks or months and could then be cured as rapidly as though treatment had been instituted on the first days of the onset. After weeks or months there was present the same chemical irritant as on the first day of the attack. After weeks or months the disease might cease spontaneously and the joints would be found to be in as good condition as they were before the disease began. There would be left no impairment of function or of structure. Uncomplicated acute rheumatism, irrespective of duration of virulence, Dr. Winters had never seen end in suppuration. The natural history of rheumatism had no parallel in diseases. The chemical pathology made it intelligible and clear.

DR. EGBERT LEFEVRE said that Dr. Winters had not differentiated between the arthritic conditions which were undoubtedly due to faulty metabolism and acute articular rheumatism or rheumatic fever. If he included the many conditions known as rheumatic many of his premises and the conclusions based on them could be accepted. If, however, acute articular rheumatism was only considered, then many of his premises could not be accepted. He was not willing to subscribe to the statement that acute rheumatism was entirely dependent upon faulty metabolism resulting in the body from the want of a neutralizing base. He believed that the infectious nature of acute rheumatism must be considered. He believed in the infectious nature of rheumatism, although they had not yet found the infectious agent, and, furthermore, he believed that rheumatism was not due to a single infective agent, but to a number, as the streptococci, the pneumococci and the influenza bacilli. He was a strong believer in the efficacy of salicylic acid not only to control symptoms but also to modify sequelæ.

DR. HARLOW BROOKS said that he could not resist the firm conviction that acute rheumatic fever should be grouped with the infections, and personally he believed that it was a mixed infection.

There were a few facts not mentioned by Dr. Winters which tended to support the chemical theory. One of them was the well-established observation that this disease existed for the greater part in localities and among subjects who were very re-

sistant to most infections; it was a disease notably of the vigorous and of the out-door liver. The well-established relationship between climatic and seasonal conditions, between dietetic and other predisposing factors, and the occurrence of the disease might also be used as an argument in this direction. Taken as a whole, however, the clinical aspects of the disease were certainly those of an infection; its pathologic anatomy was also typically that of an infection.

Dr. Brooks had not felt the satisfaction expressed by Dr. Winters in the use of the salicylates. He did not feel that it had shortened the course or prevented complications to any very great extent. He could not look upon this remedy as a specific in rheumatism.

DR. CHARLES GILMORE KERLEY had been led to believe from his observations that there was unquestionably a chemical factor in rheumatism and that this represented a means of furnishing a favorable soil for the development of infection, the actual factor in rheumatism. Certain articles of diet undoubtedly had an influence in preparing a field for the infection of rheumatism; children who partook largely of cane sugar and high fat were in his observation particularly susceptible. The so-called growing pains of children were frequently relieved by the removal of the tonsils, the probable source of infection. Dr. Kerley believed that the salicylates were useful in a few cases, but he also believed in the alkaline treatment as particularly valuable in preventing recurrences. Placing children who had had rheumatism in its acute form on salicylates and the alkalies often prevented recurrent attacks.

DR. WALTER LESTER CARR said that if they accepted the chemical, uric acid, theory that was for so long the definite view of many able clinicians, they could not fail to agree with most of the paper presented here, and their discussion was limited to expressions of acceptance of many of the views advanced. Lithemia undoubtedly lowered the resisting power of cells. If, however, they believed that the word "rheumatism" had a different significance than was attached to it three or four decades ago and they attempted to explain this wider vision, they became cognizant of the many variations presented by the disease and the extreme difficulty of drawing a clear picture of all the cases that were formerly classed under rheumatism.

No one at this time could call an arthritis associated with

scarlet fever rheumatism, nor did many fail to recognize the changes in joint and other membranes during the course of pneumonia as anything but that occasioned by the primary (pneumonia) infection. Up to the present enough had been learned of the bacteriology of rheumatism to show that the disease was occasioned by microorganisms; the exact organism that produced the majority of the cases was not agreed upon by investigators, although the consensus of opinion favored the organism of Poynton and Payne. In almost all cases the site of infection was the throat, but it was possible to have entrance through the intestinal wall by a process of sub-infection.

The diplococcus found in rheumatism had an affinity for mononuclear leukocytes and for endothelial cells. Meyer found that the diplococcus was not present in the blood or fluid. This organism produced formic acid and had a hemolytic action. The formic acid was found in the urine and explained in part at least its acidity during a rheumatic seizure. The hemolytic action of the organism was shown by the anemia present in a greater or less degree in all these cases.

DR. A. D. HIRSCHFELDER, Baltimore, said that as fascinating as these speculations might be they should not overlook the more obvious relations of morphology and bacteriology, and he could only agree with the previous speakers in accepting the multiple bacterial origin of rheumatic fever. He asked Dr. Winters if arthritis had ever been obtained in experimental poisoning with acids, or whether it was a common occurrence in the acid intoxication of severe diabetes.

In regard to the feeding, one important point in the management of heart disease was that at each stage of the disease the diet should be sufficient to supply the amount of energy used up by the patient and should be varied to meet these needs, though it should not be excessive.

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. T. WOOD CLARKE.
DR. CHARLES E. FARR.
DR. S. W. THURBER.

DR. C. D. MARTINETTI.
DR. RICHARD M. SMITH.
DR. J. HERBERT YOUNG.

BACTERIOLOGY.

CIONINI, E.: RAPID LABORATORY DIAGNOSIS OF DIPHTHERIA. (*Gaz. Tuberc. Med.*, May, 1910.)

Cionini claims to have simplified Schepilewsky's method of diagnosis. To 10 c.c. of Loeffler serum composed of three parts of serum and one of broth he adds five drops of fuchsin solution. Once sterilized and solidified, this medium receives the supposed diphtheric material and is placed in a thermostat for twenty-four hours. If diphtheric bacilli are present, a vivid red color appears, produced by the acids generated by the microorganisms, whilst if they are not, the color is light rose. Loeffler's bacilli give this reaction in twelve hours. In thirty-six hours the red becomes less vivid and in forty-eight has disappeared. Cionini declares this reaction to be a conclusive diagnostic sign, having tested it in a large number of cases.

C. D. MARTINETTI.

DISEASES OF EAR, NOSE AND THROAT.

PERKINS, CHARLES E.: MASTOIDITIS FOLLOWED BY CEREBRAL SYMPTOMS; RELIEVED BY DECOMPRESSION OPERATION. (*Annals of Otology, Rhinology and Laryngology*, June, 1911, p. 432.)

On November 29, 1910, a boy of seven and one-half was admitted to Bellevue Hospital with a history of a persistent aural discharge following a mastoid operation one year ago. Two weeks before entering the hospital a swelling had developed behind the ear and the lower angle of the old wound had broken down. The mastoid was opened the next day and the inner table and dura appeared normal where they were exposed. He appeared to be doing well until December 2d, when he was taken with a convulsion and became unconscious. As the convulsive movements continued and were limited to the side opposite the mastoid, an extensive area was exposed in front of, and above, the mastoid and the bone removed over the lower part of the temporo-sphenoidal lobe. Wound was completely healed in eight weeks and patient discharged cured.

S. W. THURBER.

SURGERY.

BAUER, A.: CONSERVATIVE TREATMENT OF PROLAPSE OF RECTUM. (EINE NEUE KONSERVATIVE BEHANDLUNGSMETHODE DES MASTDARMVORFALLS.) (*Beiträge zur klin. Chir.*, Tübingen, August, 1911.)

For the treatment of rectal prolapse in children, Bauer uses a celluloid corset fitted around the waist and hips, applying pressure by means of an elastic spring to the intergluteal fold just above the anus. This elevates the pouch of Douglas, which, he thinks, by its sagging is the cause of the prolapse. The corset is only to be worn a few weeks, when physiologic conditions are restored and the tendency to prolapse is cured. In Bauer's 6 cases a cure was effected in a comparatively short time by this simple means.

CHARLES E. FARR.

BLOCHMAN: EINE WICHTIGE FORM VON FUNKTIONELLEM DARMVERSCHLUSS IM SÄUGLINGESALTER UND IHRE BEZIEHUNGEN ZUR HIRSCHSPRUNGSCHEN KRANKHEIT. (VALVULAR INTES-TINAL OBSTRUCTION IN INFANTS.) (*Berlin Klin. Woch.*, March 27, 1911, Vol. XLVIII., No. 13, p. 564.)

Blochman reports cases similar to that of Göffert, confirming his contention that cases diagnosed as Hirschsprung's disease are not always true megacolon congenitum, but are often intestinal obstruction due to some valvular mechanism. These cases are cured by the systematic use of a soft rectal tube.

J. HERBERT YOUNG.

KIRSCH, E.: SCOLIOSIS BEGINS IN INFANCY. (BEGINN DER SKOLIOSE.) (*Jahr. für Kinderhk.*, Berlin, September, 1911.)

Kirsch believes that the scoliotic tendency begins in infancy, especially in those children who have had rickets. For a careful examination the child is made to lie prone on the stomach, the arms at right angles and the head turned first to the right and then to the left. Any tendency to curvature is easily recognized by glancing along the spines of the vertebrae and the X-ray will complete the diagnosis. In an examination of 196 children between the ages of six months and two years, the author found curvature present in 5 per cent. He uses the correcting bed, and persists in it for years if necessary. The results are very favorable where the treatment is carried out faithfully.

CHARLES E. FARR.

BRUNING, H.: PROLAPSE OF THE URETHRA IN LITTLE GIRLS. (UEBER HARNRÖHRENVORFALL BEI KLEINEN MÄDCHEN.) (*Jahr. für Kinderhk.*, Berlin, July, 1911.)

Brüning has found records of 76 cases of prolapse of the urethra in little girls and reports one of his own in a healthy girl of eight years occurring suddenly and without apparent cause. In his case there was a complete prolapse of the entire mucous lining of the urethra. This accident occurs only in early infancy, and between the ages of eight and twelve. The prolapse was accompanied by hemorrhage in 41 per cent. of the cases. In a large number of the cases the prolapse was not recognized and the results of treatment were very bad. Brüning says the child should be kept in bed, the prolapse reduced and astringents or even the cautery applied. If simple measures fail, or if the prolapse is total, he recommends resection of the redundant portion, and suture of the divided ends.

CHARLES E. FARR.

PAYR, E.: OPERATIVE DRAINAGE OF THE VENTRICLES IN HYDROCEPHALUS. (*Archiv. für klin. Chir.*, Berlin, August, 1911.)

Payr's treatment of hydrocephalus is to drain the lateral ventricles into the venous circulation. Of the 15 cases reported, 4 were drained into the longitudinal sinus, 4 into the jugular or facial vein, and 7 into the subarachnoid or subdural space or beneath the temporal muscle. He used for the drainage canal a segment of calf artery within the brain and a piece of the patient's saphena for the external portion. Drainage was perfect in every case. The ages varied from six months to twenty years. Eight survived beyond the first few months, and of these 4 were completely cured. The fatal results were due to too rapid evacuation of the fluid in 2 cases, to primary infection in 1, and secondary infection through a fistula in 4. All were very severe cases.

CHARLES E. FARR.

KOPLIK, HENRY: THE TREATMENT OF CHRONIC NEPHRITIS IN CHILDREN BY THE EDEBOHLS OPERATION. (*American Journal of Diseases of Children*, Vol. II., No. 4, p. 267.)

The author reports the operation of Edebohls on 5 cases of chronic nephritis. The operation was done with a view to relieving the distressing symptoms of anasarca and uremia. The operation was used only as a last resort after medical treatment

had proved unsuccessful. In none of the cases did the operation endanger the life of the patient. In 4 of the cases distinct benefit was secured. One case died without benefit from the operation. Two facts are brought out by these cases: first, the absolute well-being of the patients in the successful cases for great lengths of time after operation, and second, the fact that the operation does not compromise the recuperative powers of the kidney. The author believes that such an operation is indicated in chronic cases, but that it is inadvisable in the face of acute uremic symptoms.

RICHARD M. SMITH.

SACK, H.: OPERATIVE TREATMENT OF PROLAPSE OF RECTUM IN CHILDREN. (MASTDARMVORFALL BEI KINDERN.) (*Therap. Monat.*, Berlin, September, 1911.)

After reviewing the many different methods for the cure of rectal prolapse in children, Sack advocates tamponing the retrorectal space according to Ritter's modification of the Sick operation. The incision is made from the tip of the coccyx to the edge of the sphincter, the loose connective tissue behind the rectum is opened bluntly up to the promontory and then a passage is made entirely around the lower segment of the rectum. Through this opening a strip of gauze is worked, encircling the lower rectum and the ends are brought out crossed, and sutured to the skin above the coccyx. The retrorectal space is then tamponed and the incision closed except for the drainage opening. In this way the rectum is made to adhere firmly to the surrounding tissues and the tendency to prolapse is cured. Sack has operated on 2 cases by this technic, both cases resulting in a perfect cure. The tampons were removed the fifth day and the children were allowed to be up and about from the first. There was no interference with defecation and the encircling strip prevents prolapse while the adhesions are forming.

CHARLES E. FARR.

MEDICINE.

VISCO, FRANCESCO: EXTRASYSTOLIC PERIOD IN INFANCY. (*La Pediatria*, May, 1911.)

The author's conclusions following a long series of observations are as follows:—

- (1) An extrasystolic period, existing well-defined in infancy,

has been observed in 48 cases out of 1,000. It reveals a disturbance of heart action caused by an external stimulus.

(2) This abnormal state is no indication of cardiac affection nor of debility, general or local, but is purely a functional disturbance of relatively small importance.

(3) It is caused by the various forms of intoxication or by nervous irritability.

(4) Quiet, rest and sleep, combined with hygienic surroundings, are usually sufficient to restore a normal condition. Our present knowledge of the subject does not warrant giving the discovery of an extrasystolic period in an infant any diagnostic or prognostic importance.

C. D. MARTINETTI.

AMBERG, SAMUEL, AND KNOX, J. MASON: HIPPURIC ACID IN THE URINE OF NORMAL BREAST-FED INFANTS. (*American Journal of Diseases of Children*, Vol. II., No. 4, p. 243.)

The authors investigated the urine of normal breast-fed babies to determine its hippuric acid content. According to the investigations of Moll the amount of phosphuric acid excreted in the urine may serve to indicate a slight digestive disturbance. Only urine was used which was "free from phosphates" and therefore from normal infants. They conclude that no appreciable part of the nitrogen content in the urine of these infants is excreted in the form of hippuric acid. The absence of hippuric acid depends upon the absence of benzoic acid. The benzoic acid in adults is derived from benzoic acid or related substances contained in the food or from putrefactive processes in the intestinal canal. Since such food and these processes are at a minimum in the digestive tract of normal breast-fed infants, the absence of hippuric acid from the urine is not surprising.

RICHARD M. SMITH.

SEDGEWICK, J. P., AND SCHULTZ, F. W.: RELATIONSHIP OF GASTRIC TO PANCREATIC FAT DIGESTION IN INFANTS. (*American Journal of Diseases of Children*, Vol. II., No. 4, p. 243.)

The presence of lipase in the gastric juice of infants is considered established and also the presence of pancreatic steapsin. Studies were carried on to determine the connection between these two juices. Attempts to simulate the conditions in the body

were made, that is, an emulsion was put under the influence of gastric juice for two hours, then neutralized and subjected to pancreatic extract for three hours. The amount of fat split was 23 per cent. greater when the emulsion was subjected to the gastric lipase before the pancreatic ferment. Further combinations with boiling the contents after the addition of gastric juice, etc., were conducted and the conclusion drawn that neutralization of the fat gastric digestion does not end the function of the gastric lipase of the dog or infant. Whether the effect is a summation of or a relationship between the actions of the two ferments cannot be stated with certainty but it is evident that the function of the gastric lipase of the infant is not ended when the gastric contents pass the pylorus.

RICHARD M. SMITH.

COTTA-RAUMSINO, C.: TREMOR IN INFANCY. (*La. Ped.*, March, 1911.)

After a careful study of several cases, Cotta-Raumsino is of the opinion that excluding the cases in which tremor follows in the wake of some other affection, in most instances we have a slow inflammatory process of the cerebrum. This may not be sufficiently pronounced to give other symptoms. If the action on the motor centers is mild and transitory, there are no permanent anatomical lesions and recovery follows.

C. D. MARTINETTI.

SAINT-PHILIPPE ROUSSEAU: UNRECOGNIZED CONSEQUENCES OF PERTUSSIS. (*La. Ped. Prat.*, July, 1911.)

The author is of opinion that pertussis is worthy of very careful study. Very frequently only one or two of the many diagnostic signs are in evidence and it is only with much difficulty that an absolutely positive diagnosis can be made. One should carefully examine the character of the cough, of the paroxysm, the expectorate itself and the blood of the patient. Unnecessary delay in arriving at a diagnosis should be avoided. Atypical and suspicious cases often prove the most dangerous. Patients should be invariably strictly quarantined, and never allowed in clinics or dispensaries. The course of the disease should be followed, patiently administering suitable remedies, because prolonged cases have been known to lead to tuberculosis. It should not be forgotten that pertussis both directly and indirectly is responsible for a very high mortality.

C. D. MARTINETTI.

NOBECOURT: RENAL FUNCTION IN ACUTE NEPHRITIS OF INFANTS. (*La Med. Infant*, 1911, Vol. VIII., p. 121.)

The author discusses the investigation of renal function by the determination of sodium chlorid and urea elimination as a basis for the estimation of prognosis and treatment. He says that the amount of albumen, the findings in the sediment or the methylene blue test are not conclusive in estimating kidney function. He would divide all cases of nephritis into three groups, first those with simple albuminuria; second, those with chlorin retention, and third, those with urea retention. A fourth group would contain combinations of these. The first group, simple albuminuria, occurs, usually following a fever or secondary to some condition elsewhere in the body. The sodium chlorid and urea elimination is normal in these cases and they show no symptoms referable to the albuminuria. In the second group of chlorin retention, the patients have edema, scanty urine which is high colored and contains blood and casts. Frequently there is also vomiting, diarrhea and convulsions. The essential phenomenon of this group is the retention of sodium chlorid, upon which is dependent the accumulation of water. With the improvement in the condition of the patient the elimination of sodium chlorid increases and therefore the edema disappears. In the second group of urea retention there is slight edema not accompanied as a rule with increase in body weight and there is no retention of sodium chlorid. The most characteristic symptoms are loss of appetite, nausea and vomiting. The retention of urea may be demonstrated in the cerebrospinal fluid. In the last or combined group there is a certain amount of sodium chlorid retention with only moderate edema and some gain in body weight, and there may be moderate retention of urea. Simple albuminuria does not produce changes either in blood pressure or in the size of the heart. In the type with chlorin retention one may see both increased blood pressure and cardiac hypertrophy. These changes go along with increase in body weight and are not of great consequence, but in the type of cases with urea retention either alone or in combination there is almost always increased blood pressure and temperature and also increase in the area of cardiac dullness. It is possible for a case starting as simple albuminuria to progress to either one of the other types. The treatment of simple albuminuria can practically be neglected, except that it is advisable to put the

patient on a milk diet. In the form of chlorin retention the milk should be reduced to a minimum amount because of its large water content and the necessary food value should be supplied by the addition of cereals. Frequently in these cases the disappearance of the edema may be accelerated by the administration of diuretics. In the cases of simple urea retention, and the combined urea and sodium chlorid retention the diet should begin with small amounts of milk which may be gradually increased and other articles rapidly added, always keeping the amount of albumen small. These indications are applicable only to cases of acute nephritis; cases of chronic nephritis should be considered from a different point of view. The author cites cases illustrating various types of nephritis and their response to appropriate treatment.

RICHARD M. SMITH.

LANGSTEIN, L.: ZUR KENNTNIS EOSINOPHILER DARMKRISEN IM SÄUGLINGESALTER. (EOSINOPHILE INTESTINAL CRISES IN INFANTS.) (*Münch. Med. Woch.*, March 21, 1911, Vol. LVIII., No. 12, p. 623.)

Langstein has observed in infants sudden attacks in which mucus and pus containing large quantities of eosinophile cells appear in the stool. Alimentary and infectious disturbances can usually be excluded and the disorder is probably a complication of the exudative diathesis. The prognosis, which is dubious when mucopurulent stools appear in infancy, becomes favorable if eosinophiles are present. It is not necessary to place the child on a starvation diet, a slight restriction of the amount of nourishment is all that is required. The general condition of the child is scarcely affected, the temperature is normal and the loss of weight inconsiderable.

J. HERBERT YOUNG.

THERAPEUTICS.

MEARA, F. S.: THE TREATMENT OF BACILLARY DYSENTERY. (*Interstate Medical Journal*, September.)

In discussing the treatment of dysentery, the author limits himself to that type produced by the bacillus (or group of bacilli) spoken of as the bacillus dysenteriae. Rest in bed, which takes away most of the stimulus to increased peristalsis, is desirable in all cases, though in the milder cases the patient will

often not accede to such plan. In the more severe cases, however, this becomes imperative, and special stress is laid by the author upon the selection and arrangement of the sick-room and bed. Milk meets the dietary requirements better than any other food. The writer's routine practice has been to put the patient on a milk diet, ordering the milk boiled and given every two hours, the patient to take what he will of 8 ounces. When the temperature disappears and the stools have lost their diarrheal character, barley jelly and thoroughly boiled rice, and later toasts, then egg—and gradually the resumption of normal diet. Water should be given freely and all food must be given warm. A dose of castor oil, from $\frac{1}{2}$ to 1 ounce, is especially recommended at the onset of the trouble. Following this the author has found the following prescription especially gratifying, probably due to the ol. ricini:—

℞ Tr. opii deodorati	1.
Salol.	2.50
Olei ricini	10.
M. et Div in capsulæ No. XV.	
S. One every two hours.	

For the colicky pains hot fomentations are often of value. Comfort may also be afforded by warm rectal irrigation at 100°-105° F. of physiologic salt solution. About 2 quarts may be used at a time, in some cases even more. The irrigation may be followed by an astringent, the best being silver nitrate. It should be used in increasing strengths, 1 to 2,000 at first and increasing up to 1 to 500. If the solution of silver gives great pain it is too strong and may be neutralized by salt solution. The treatment must be intermitted occasionally to let the mucosa recover from any possible irritation by the silver. At times the chronicity of the disease may be due to the irritation these very measures keep up, and a cessation of local measures is followed by rapid recovery. If the tenesmus is very severe the following suppository is recommended:—

℞ Opii pulveris	gr. 1
Extr. belladonnæ fol.	gr. $\frac{1}{4}$
Olei theobromatis	q. s.

When the pain is too great to be relieved by these, morphin hypodermically has to be used. For the diarrhea the author relies upon opium rather than bismuth, for which he has slight regard. The opium need rarely be used in greater dosage than one drop of the tincture every two hours. In convalescence from severe cases much too little use is made of carbohydrates in the dietary. Barley, rice, farina, bread and butter, and cereal soups should all be used. Beef, mutton and chicken and the purées of the vegetables may also be allowed. Under-nutrition is to be carefully avoided.

ALLARIA, G. B.: THE ORDINARY TROCAR IN PLEURITIC CHILDREN INSTEAD OF THE ASPIRATOR. (*La Ped.*, August, 1911.)

Aspiration of pleuritic exudate by the usual methods requires more or less complicated apparatus. Not long ago Japanese journals advocated a return to the plain trocar, since any air that might penetrate through the needle was demonstrated to have no harmful effects. Allaria has treated a large number of patients in this manner with excellent results. He gives a detailed account of the technique followed. C. D. MARTINETTI.

ALLARIA, G. B.: EFFECTS OF DRY HEAT ON NEPHRITIS. (*La Ped.*, June, 1911.)

Allaria has conducted a long series of careful tests on the effects of dry heat on children affected with nephritis. Local hot applications like the hot electric pad do not give appreciable results. In the absence of special hot-air ovens he has employed the following simple method. The child reposes in bed with an ice-bag on its head. The bed clothes are pinned tightly around its neck and lower down kept elevated by wooden arches, forming a species of tent. At the foot of the bed the heat generated by a lamp in a box is admitted through a tin pipe.

The duration of the treatment is between half an hour and one and a half hours, the temperature reaching a maximum of 55°C.

These treatments are always well borne, with no unpleasant effects. Internal temperature is not altered. Nervous symptoms are promptly allayed and renal hyperemia modified. Diaphoresis is very pronounced, causing an average loss of weight of 250 grams. The examination of the urine shows

higher specific gravity, increase of urea and chlorides. The bloody sediment if present decreases.

In conclusion, the author is of opinion that the most favorable results are to be had in the cases of parenchymatous nephritis frequent in infancy. In chronic nephritis results are not so uniformly good. Uremic symptoms especially invariably yield to this treatment.

C. D. MARTINETTI.

INFANT FEEDING.

FRANCIONI, C.: MATERNAL NEPHRITIS AND ITS EFFECTS UPON NURSING. (*Rivista di Clin. Ped.*, July, 1911.)

Women who have been subjects of puerperal eclampsia should not be allowed to nurse until at least one week has passed since the subsidence of the symptoms. During the illness the kidneys do not eliminate normally and toxic material accumulates, which brings about an alteration of the milk secretion, more or less in proportion to the severity of the attack.

C. D. MARTINETTI.

NOSS, P.: SUBCUTANEOUS INJECTIONS OF MILK. (*Le Scalpel*, June, 1910.)

Experimentally, subcutaneous injections of milk have produced abundance of albuminoid material for the nourishment of the mammary glands. The best results are obtained injecting into a woman her own milk with every antiseptic precaution. The injections should only be given at intervals of at least eight days. They never produce local reaction.

C. D. MARTINETTI.

MARRE, M. FRANCIS: INFLUENCE OF ACUTE DISEASE UPON NURSING. (*Rev. di Hyg. et de Méd. Infant.*, No. 4, 1910.)

During acute diseases in general the production of milk diminishes, as does that of sugar. At the same time fats, casein and salts are increased, so that satisfactory nourishment is still obtained by the infant. The author advises to continue nursing whenever possible; artificial feeding should only be resorted to during a long illness like typhoid.

C. D. MARTINETTI.

MISCELLANEOUS.

SEVERINO, GIUSEPPE: A RARE MONSTROSITY. (*La Ped.*, April, 1911.)

The author describes a child of four years perfectly normal in every respect save that she was born without a left forearm. Absolutely no history of syphilis or alcoholism or of any disease whatsoever. The stump of the left arm was slightly larger than the right arm; an X-ray examination revealed a normal humerus whose distal end was also normal. The forearm might have been carefully disarticulated at the elbow. Severino claims that his case is absolutely unique.

Four other cases of absent limbs in living children are known, those of Albrecht, Geoffroy St. Hilaire, Dupuytren and Illawacek, but in all these there was more than one limb affected. The author does not attempt to give any explanation of the monstrosity.

C. D. MARTINETTI.

BARBAROSSA, ADELE: HISTOLOGY OF THE THYMUS GLAND. (*La Ped.*, June, 1911.)

Conclusions drawn from a careful study of the histology of the thymus are as follows:

(1) The thymus in man does not disappear at the age of fourteen as generally admitted.

(2) The thymus is a gland of internal secretion, whose function is still unknown.

(3) The function of the gland takes place both during intra-uterine and extrauterine life for several years.

(4) This function is principally due to Hassall's corpuscles.

(5) Hassall's corpuscles are of two kinds—belonging to the period of evolution of the gland and to that of involution.

(6) The corpuscles of the first order are epithelial residues of the thymus, to which is probably due the glandular action. Those of the period of involution appear to originate in the endothelium of blood vessels, and this is proved by the fact that in its latter stages the thymus shows scarcity of blood vessels, whilst Hassall's bodies are on the increase both in number and size.

C. D. MARTINETTI.

ARCHIVES OF PEDIATRICS

DECEMBER, 1911.

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PUBLISHED MONTHLY BY E. B. TREAT & CO., 241-243 WEST 23D STREET, NEW YORK.

EDITORIAL.

SOCIOLOGY AND PEDIATRICS.

The programme of the American Association for the Study and Prevention of Infant Mortality was criticized by a competent pediatricist as being weak because there was such a small portion of the programme given over to medical men. The critic felt, as do many others in the profession, that the bulk of the information relating to infancy and its mortality is in the possession of the medical fraternity. As far as the strictly medical facts are concerned the critic may be correct.

It is a safe conjecture, however, that the basic fundamental facts underlying the problems of infancy and the social causes that are involved in the tremendous mortality of the first day,

first week, first month, and first year are not matters of general medical knowledge, although of general medical interest.

In all candor, can the physician be said to be grounded in the fact of sociologic importance that are so closely allied to health and disease during infancy and childhood? Are physicians sufficiently interested in the sociology that is coming to be recognized as an essential part of the work of preventive medicine as well as its therapy?

At the present time, to be thoroughly abreast of the general education of the masses, it is essential to have positive information relating to many subjects that formerly were regarded as strictly within the domain of the theoretical sociologist, economist, or philanthropist.

To state that many of the most active movements for the betterment of the health of municipalities, for promoting the welfare of the race have originated from extra-medical sources is a striking criticism, even though in the advance of the movements medical men have entered with enthusiasm and activity. Health problems are essentially medical problems. If the roots of the evils endangering the public health reach down to the social life of the people, if ill health is traceable to industrial conditions, unjust legal enactments or to religious discriminations, then those subjects rightfully become of medical importance. The best type of physician must then undertake to understand the point of view of the economist, sociologist, jurist, or philanthropist. Having secured the adequate point of view and having acquired the facts essential to the full understanding of the social problem the medical man becomes a speaker with greater weight and authority than almost any other type of worker in the community.

Appreciating the fact that medical education has not taken cognizance of the relation of interdependence of sociology and medicine it appears desirable for more attention to be given to this aspect of the problems of pediatrics. The most valuable contributions to the progress of medicine in infancy and childhood may be found closely interwoven with the progress of the numerous agencies at work for the betterment of the social life during this period of life.

No one can deny the value to the pediatricist of a study of eugenics, inebriety, the social evil. The prenatal care of women,

the midwife problem, the use and abuse of the forceps by men improperly trained in obstetrics, the prevention of ophthalmia neonatorum are pediatric problems. The care and training and cure of the mental defectives, the institutional care of foundlings, the cottage system in children's institutions, the home care of defectives, the questions connected with the formal adoption of children, the special classes in public schools for backward children are of pediatric importance. The prevention of tuberculosis, preventoria, open air schools, school lunches, school construction, lighting and ventilation, play grounds, park systems are worthy of study. Child labor in shops, factories, mines, oyster-beds, cranberry bogs, or on the stage has striking medical phases. Housing plans, tenement-house laws, city congestion, room congestion, boarding systems are given too little study in their relation to the growth and development of children. Wages, the cost of living, dispensary abuses are not so remote from the problem of caring for children. Medical inspection of the schools, school nursing, district nursing, sick insurance, are germane to the general study. Pure foods, maternal nursing, infants' milk stations, consultations, proprietary foods, dietaries in children's institutions, demand further study. Day nurseries, homes for delinquents, county jails, the probation system reform schools have many medical problems.

It does not appear necessary to point out more lines of contact of sociology and pediatrics save the essential basis that is so much neglected throughout this country: the necessity for an adequate system of recording the births and deaths. The medical profession should be in the front rank of those demanding an efficient plan that will have the active co-operation of the States, the health officers, and the physicians themselves throughout the country.

With a view of bringing the readers of the ARCHIVES OF PEDIATRICS into closer touch with the various sociologic events that are of value to physicians interested in infancy and childhood, we shall publish frequently articles on this special subject, hoping that they may keep our readers in closer touch with sociologic problems, and may gain their active interest for them.

ORIGINAL COMMUNICATIONS.

ALBUMIN MILK AS CONTRASTED WITH OTHER MILK MIXTURES IN THE TREATMENT OF THE DIARRHEAS OF CHILDREN.*

BY HENRY HEIMAN, M.D.,

New York.

(From the Service of Dr. Koplik at the Mt. Sinai Hospital, New York City.)

Basing his treatment of the diarrheas of children on the supposition that the predominant etiologic factor is bacterial infection, it has been the aim of the pediatricist until recent time to provide a sterile food which at the same time is not a suitable culture medium. With this he usually combined the administration of drugs which were supposed to produce disinfection of the intestinal tract. The view that bacterial infection plays an important part in the diarrheas of children has gradually been losing ground in the last few years, chiefly due to the work of Czerny, Keller, Finkelstein, Meyer and Pfaundler. These investigators have shown that in a great majority of cases bacterial infection plays but a secondary rôle, and that the predominant factor is one or more constituents of the food which produces a disturbance in the metabolism. With the coming forward of this view it can be readily seen how the dietetic treatment must assume more and more importance. First of all, the proteids were held responsible, then the fats, and last the carbohydrates have been accused of being the offending agent. Starting with this supposition, that the carbohydrates are the active producers of fermentation in the intestines, Finkelstein and Meyer have recently advised the use of a food which they call "Eiweiss milch" or "albumin milk." The experience of Finkelstein and Meyer at the Kinderasyl in Berlin showed that an infant food which is adapted for the removal of intestinal fermentation must contain a minimum amount of carbohydrates and salts with a normal amount of casein and a variable amount of fat. They found that casein, when added to the diet of an infant

* Read before the Twenty-third Annual Meeting of the American Pediatric Society, June 2, 1911.

suffering from intestinal fermentation, produces a rapid improvement in the stools.

Such a food is prepared as follows: A tablespoonful of Simon's essence of rennet (or two tablets of rennet) is added to 1 liter of milk, which is then placed in a water bath at 42°C. for one-half hour. It is then filtered slowly by gravity without any pressure for about one hour through cheesecloth. The coagulum is then washed twice in $\frac{1}{2}$ liter of water through a very fine sieve and forced through by means of a wooden club. Then $\frac{1}{2}$ liter of buttermilk is added. The chemical analysis of this food shows:—

	Eiweiss Milk.	Cow's Milk.
Proteids	3.00	3.00
Fats	2.50	3.50
Carbohydrates	1.50	4.50
Ash	0.50	0.70

A liter of Eiweiss milk contains about 370 calories.*

Finkelstein and Meyer's results with this food in cases of diarrhea, including those of dyspepsia, decomposition, intoxication and parenteric infections, were strikingly brilliant. In most cases the diarrhea disappeared in the course of three days and the temperature became normal. It was found, however, that in the majority of cases there was a loss of weight during the continuance of exclusive feeding with Eiweiss milk. To overcome this loss, sugar in the form of Soxhlet's sugar, Liebig's extract or Loefflund's maltose was added in increasing quantities, as soon as the stools became formed. In most of the cases Eiweiss milk was used from eight to twelve weeks. In none of them was any deleterious effect demonstrated from this mode of feeding.

Finkelstein and Meyer's report on the striking results obtained with this food came out in the May and June numbers of the 1910 *Jahrbuch für Kinderheilkunde*, and did not reach us until July. Several weeks were consumed in overcoming technical difficulties in the preparation of the food, so that the greater half of the diarrhea period passed before it could be employed at the bedside. These remarks are made in anticipation of a possible criticism of the small number of cases reported upon. In

* Since the reading of this paper I have regularly added 1 grain of saccharin to each quart of albumin milk, finding the palatability of the food considerably increased by this addition.

analyzing our tables it was unfortunately found that a considerable number had to be excluded for one reason or another as inconclusive, so that there remained only 13 cases for the present report, which, had it not been promised for the present meeting, I would feel very reluctant to present at this time.

Eiweiss milk was administered to 13 patients suffering from diarrhea for a length of time sufficient to determine its immediate effect on the general and local condition. I wish to make it clear that my aim was not to study the results of a prolonged use of the food, but its effect during the first five days. This, to my mind, is the only fair test for the efficiency of any antidiarrheal dietetic or remedial agent. For the purpose of proper classification these cases were divided into moderate and severe. The moderate cases included those with only slight fever, mild general symptoms, and green stools varying from six to ten a day, containing mucus. The severe cases included those in which there was prostration, pyrexia and very many stools, eight to ten or more a day, green in color and occasionally blood-streaked. The latter class would come under the head of alimentary intoxication of Finkelstein. There were 7 cases of the moderate type. Their ages were:—

One	4½	months
Two	5	"
One	7	"
"	12	"
"	15½	"
"	16	"

All with the exception of two had previously been breast and bottle fed. Two were exclusively bottle fed. The duration of the disease previous to the admission to the hospital varied from five days to five weeks. The Eiweiss was given for a period varying from three days to twelve days. The effect of the administration of Eiweiss on the stools is shown in the following table:—

Prior to treatment.	Condition of stool after
1st case. 6 green stools.	Yellow after four days.
2d case. Very many green stools.	Three green after eight days.
3d case. 5 green stools.	Two green after second day.
4th case. 10 green stools.	One green after second day.
5th case. 6 green stools.	Two green on third day.
6th case. 6 green stools.	No change.
7th case. 3 green stools.	One yellow after three days.

Of these 3 gained from 2 to 5 ounces and 4 lost from 2 to 5 ounces.

Maltose was added from the second to the tenth day, and in 1 case at once. All but one of these recovered.

There were 6 cases of the severe type—4 were exclusively bottle fed; of the 2 others 1 had breast for three weeks and 1 for two months. The ages were:—

One	2 months
"	5 "
"	8 "
"	11 "
"	13 "
"	15 "

The duration of the disease varied from four days to seven weeks. The Eiweiss was administered in these cases for a period varying from two to fifteen days. The effect of the stool is shown as follows:—

	Prior to treatment.	Condition of stool after
1st case.	Very many bloody and green stools.	Green on third day.
2d case.	5 green stools.	No change.
3d case.	Frequent green stools.	Unchanged for eleven days.
4th case.	Many green stools.	Unchanged.
5th case.	8 green stools.	One, on third day, green.
6th case.	5 green stools.	Unchanged.

Three cases gained in weight and 3 cases lost; the average loss was 5 ounces and the maximum gain was 4 ounces. Maltose was added from the second to the sixth day. Three cases died and 3 recovered. The ages of the patients who died were two months, eleven months and fifteen months. The ages of the 3 that recovered were five months, eight months and thirteen months.

For the purpose of comparing these results with those obtained by the use of other forms of diet, I collected 24 cases of diarrhea—

Seven of which received whey, barley, skimmed milk and milk sugar.

Four, skimmed milk, barley and milk sugar.

Five, whole milk, barley water and milk sugar.

Five, skimmed milk with sugar and water, and

Three, barley, rice water and milk sugar.

Of the 7 cases that received whey, barley and skimmed milk, 2 were moderate; one of these had one stool on the third day, the other remained unchanged at the end of five days. The 5 severe cases showed no change in the condition in five days, although 2 ultimately recovered. The ages of the moderate type were eight and nine months, of the severe, fourteen weeks, seven months (recovered), ten months, eleven months, sixteen months (recovered).

Four received skimmed milk, barley and milk sugar. Two were moderate and 2 were severe.

Of the moderate cases, one on the fifth day had two stools and the other was unchanged.

Of the 2 severe, both of which died, there was no change within five days. The ages of the moderate cases were four months and ten months, and the severe ones were five months and twenty-two months.

Of the 5 cases fed on the skimmed milk, milk sugar and water, 3 were moderate and 2 severe. Of the moderate cases one showed reduction from six green stools to three green stools on the fifth day, another one from five green to four yellow on the fourth day, and the third was unchanged. Of the 2 severe there was none on the fifth day in one case and unchanged in the other. One of these died, the other recovered. Of the moderate ones the ages were two and one-half months, seven months and nine months. The ages of the severe were one seven months (died) and the other ten months (recovered).

Of the 3 cases that received barley or rice water, 1 was moderate and 2 severe. In the moderate case on the second day there was no stool, and of the severe, in one, there was a reduction from four to two green stools on the fourth day, the other was unchanged. The age of the moderate one was seventeen months, and the ages of the two severe were five months and sixteen months respectively, both of which died.

Taking these cases collectively, we find that there were 12 moderate and 12 severe cases. Of the moderate ones there was improvement within five days in 6 cases, and of the severe ones in 2 cases. Of the 13 Eiweiss cases there were 7 moderate and 6 severe cases. There was improvement in 5 of the 7 moderate cases, and of the 6 severe cases there was improvement in 2. We find, then, from this admittedly scant number of cases, from which I do not presume to draw any important conclusions, that

whereas only 50 per cent. of the moderate cases fed with various milk mixtures showed improvement within five days, the percentage of improvement in similar cases in which Eiweiss milk was administered was 71.

In the severe cases of the ones fed on various milk mixtures the percentage of improvement was $16\frac{2}{3}$, and in the Eiweiss cases the percentage of improvement was 33.

My impression, based on the clinical observation of the cases, is that this dietetic method of treatment deserves a further much more extended trial, which I hope I shall have an opportunity during the coming summer to carry out on a much larger series of cases. The present paper is merely offered as a preliminary study, showing at least the harmlessness of this therapeutic agent.

I wish to express my thanks to Drs. H. Emsheimer and G. Wetchler, internes at the Mt. Sinai Hospital, for their kind assistance.

HEMOPHILIA.—Sahli (*Deutsch. Arch. f. klin. Med.*, Vol. XCIX., Nos. 5, 6). Studies of a considerable number of cases of hemophilia, observed during the last seven years, have led Sahli to the following conclusions: The total number of white blood corpuscles is usually diminished in hemophilia, but, as a rule, a moderate lymphocytosis is present. The most striking peculiarity of the blood is the high percentage of eosinophilous cells and mast-cells; the blood platelets, too, are increased in number. The coagulability of the blood is much diminished. It can, however, be markedly increased by the addition of normal blood serum or of washed red blood corpuscles. These observations speak for the theory that hemophilia is a disease of the cellular elements of the blood. In all probability the latter contains sufficient fibrin-ferment but too little thrombokinase. Therapeutically, Sahli advises the repeated withdrawal of small quantities of blood and the injection of fresh, normal, human blood serum. The former stimulates the bone-marrow to the formation of fresh blood corpuscles, the latter causes the production of increased amounts of the deficient thrombokinase. Sahli's results with this method have been very encouraging.—*Interstate Medical Journal*.

DRAINAGE TUBE IN PLEURAL CAVITY. (REMOVED WITH AID OF FLUOROSCOPIC SCREEN.)*

BY FRANCIS HUBER, M.D.,

New York.

In the *Medical Record* for January 3, 1885, the writer reported a series of 26 cases, including 2 of his own, in which a drainage tube had been lost in the pleural cavity in empyema cases.

A few years ago one of the internes reported the loss of a drainage tube early one morning. At the regular visit a rib was resected and the tube readily recovered from the costodiaphragmatic sinus. Though the ordinary precautions are generally observed, the accident is of rather frequent occurrence. Dr. Hirsch, in a personal communication, stated that a surgeon in a large hospital met with the accident three times within a period of eighteen months. The following recent case is presented in detail as illustrative of the facility and certainty with which the lost tube may be recovered by a new and novel method.

Becky G., two years of age, was admitted to the Children's Service, Beth Israel Hospital, September 9, 1909. The history in brief was as follows: About the latter part of April, at that time about seventeen months old, she was operated upon for empyema by simple incision and drainage. Two months later a rib was resected; since then she has been troubled with more or less gastrointestinal disturbances. At the time of admission her general condition was reported to be good, though there was still a tendency to intestinal and gastric disorders. Some purulent nasal discharge existed, negative as to Klebs-Loeffler bacilli. Chest fairly well developed, expansion fair. Over the right side posteriorly below the angle of the scapula, a scar is seen, the result of former rib resection; also a small sinus leading into the pleural cavity. There is dullness at the base, somewhat distant breathing with diminished tactile and vocal fremitus probably due to a thickened pleura.

Left side not affected—no cardiac displacement.

September 22d: General condition poor, patient is suffering from a severe exacerbation of enterocolitis, vomits a good deal, stools frequent and greenish. Temperature irregular, varying between normal and 102°F. Drainage good.

* Read by title at the Annual Meeting of the American Pediatric Society, Lake Mohonk, June 1, 1911.

October 6th: Condition better, temperature irregular, wound closed for nearly a week. Physical examination reveals a re-accumulation of the pleural effusion. Wound reopened and drainage tube inserted; considerable pus escaped. Temperature fell to normal and with the advent of cooler weather the diarrhea grew less and less with decided improvement in the general health.

October 24th: When dressings were changed to-day the end only of drainage tube with safety-pin was found on the dress-

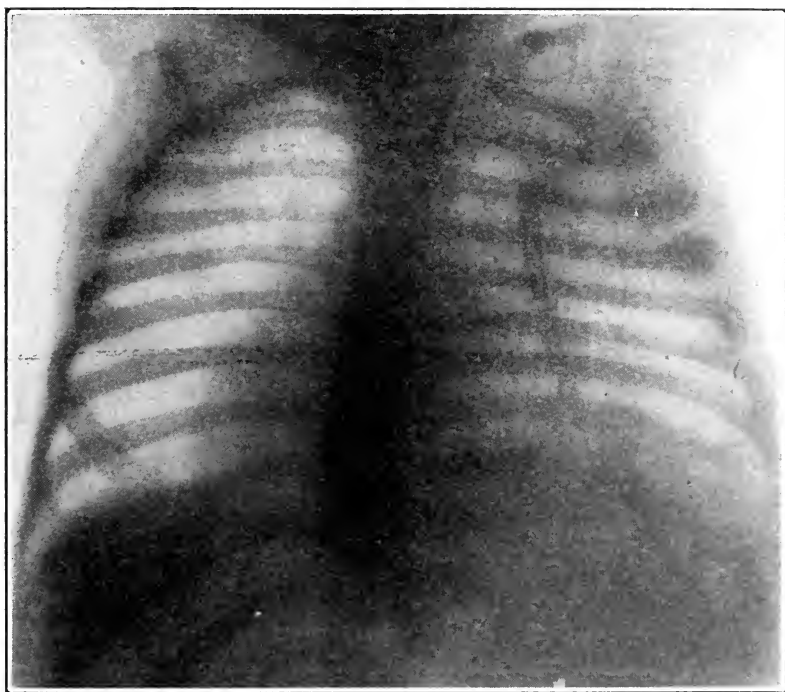


PLATE NO. I.—LOST TUBE DISTINCTLY VISIBLE.

ing, the rest, two and one-fourth inches in length (rubber catheter about 14 F), had slipped into the pleural sac. (See X-ray Plate I.)

October 25th: Ninth rib resected, cavity carefully explored in various directions with finger and forceps without success.

October 27th: Another X-ray taken (Plate II.), the adjoining rib resected, and though a careful search was made with forceps and finger the tube was not found. As the child's condition was not good further attempts were postponed for a few days.

Under stimulation and forced feeding the child improved greatly.

November 3d: The temperature having been normal for several days and the general state better, the child was again taken to the "X-ray" room, in order to locate definitely the position of the tube by means of the fluoroscopic screen. I herewith extend sincere thanks to Dr. I. S. Hirsch, radiographist to the Beth Israel Hospital for the radiographs and the suggestion to attempt

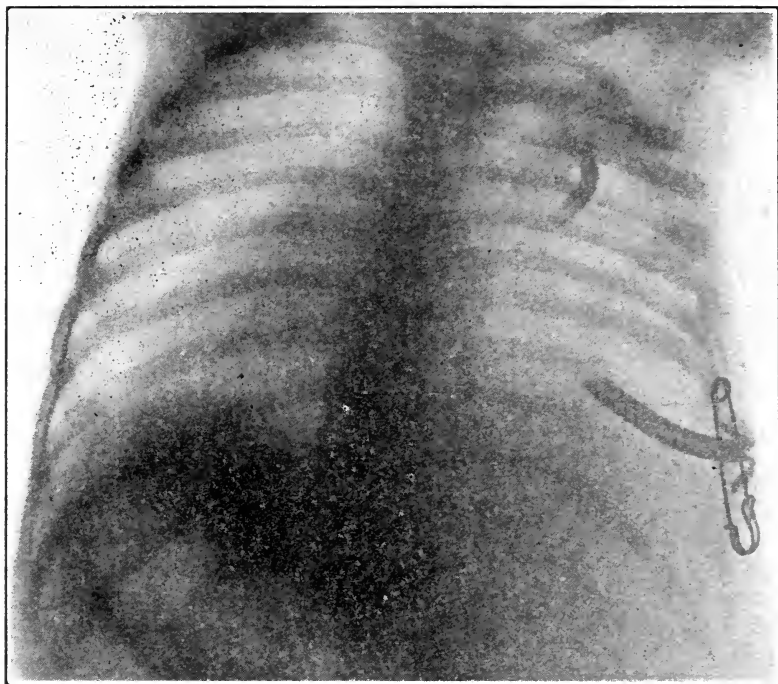


PLATE NO. II.—SHOWS CHANGED POSITION OF LOST TUBE.

Below shows tube inserted for purpose of drainage and manner of securing tube with safety pin.

the removal of the tube under the guidance of the X-ray. To carry out the idea the child was placed face downward upon the wooden table, the X-ray tube being hidden underneath out of sight of the child. Anesthesia was not required. Large curved throat forceps were then passed through the wound into the pleural cavity, and the fluoroscopic screen held in close contact with the posterior thoracic walls by Dr. H. M. Silver. The shadows of the forceps and the lost drain were readily made out

on the screen. It was a very simple procedure to open the jaws of the forceps, seize the rubber tube and accomplish its removal.

The subsequent course was uneventful. In a few days the patient was allowed out of bed. December 28, 1909, the patient was discharged, physical condition excellent, wound completely healed, pulmonary expansion good. The slight scoliosis due to the empyema had been overcome by gentle massage of the thoracic walls and proper exercise.

Since the above was written the writer has had an opportunity to adopt the same method for the removal of a foreign body from the right bronchus. The case was reported in the *Annals of Surgery, Gynecology and Obstetrics*, May, 1910.

At the time the work was done and the article was published we were under the impression that the suggestion was original with Dr. Hirsch. Since then the writer has received a courteous note from Dr. Samuel Lile, of Lynchburg, Va., from which the following is quoted: "I am enclosing a reprint from the *Virginia Semi-monthly* of February 8, 1901, showing really where the idea originated. You will notice that my idea was correct, even if I did fail to carry it out with accuracy."

The article begins with the following: "The object of this paper is to call attention to the importance of the X-ray in locating foreign bodies in the air passages and esophagus, and suggest the possibility of removing them under the 'ray,' thus seeing every step of the operation, rather than probing for them with only the sense of touch as a guide." In the subsequent description of the examination of the patient under the "X-ray" Dr. Lile says: "While looking at the nail the thought occurred to me, How easy it would be to pass a pair of forceps down inside the trachea into the tube, watch its every movement, even to grasping the nail and removing it."

To demonstrate the idea as nearly as possible, a board five feet long, sixteen inches wide and one inch thick was procured, either end resting on a chair. With the Crooks tube underneath and the ray turned on, a pair of forceps passed between the patient reclining on the board and the fluoroscope were distinctly visible. Unfortunately, at the time of operation the room was heated to 85°F. by allowing steam to escape, thus interfering with the electrical apparatus and the successful carrying out of the idea. The foreign body was removed, however, after being located with a probe, by means of curved forceps passed into the left bronchus.

SPASMUS NUTANS, WITH THE REPORT OF 4 CASES.*

BY HOWARD KENNEDY HILL, M.D.,

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Babies' Hospital, Philadelphia.

Spasmus nutans is the name given to a syndrome which appears in early infancy, usually between the third and fifteenth months, consisting of a nodding of the head forward and backward, or a shaking of the head from side to side, with nystagmus of one or both eyes. It has also been called head-nodding with nystagmus, head-shaking, *Jactatio capitis nocturna*, mal-suboccipital, gyrosplasm, coördinated movements, and by other titles.

This condition has been recognized for over sixty years, at least ever since Ebert and Faber, in 1850, and Hensch and Romberg, at about the same time, 1851, published brief descriptions of the condition; but the late Dr. H. B. Hadden, of the Hospital for Sick Children, in London, in a splendid monograph, in 1897, drew more widespread attention to the disorder. Raudnitz, also in 1897, first brought forward the theory that living in squalid quarters, where the child was in semi-darkness the greater part of the time, and straining the eyes from an unnatural position of the head, it may be to see objects, and then emerging from this into the bright sunlight for a short time, was the cause of the nerve irritation manifested by the most prominent two signs of head-nodding and nystagmus.

J. Thomson, in 1900, called it a functional coördination neurosis of a harmless nature which affects young infants and has a short, well-defined clinical course. He reported 35 cases, and laid especial stress upon three main etiologic factors—namely, the age of the patients, usually between four and twelve months, the absence of light in their surroundings, and the presence of rachitis, following the example of Sir Wm. Gowers, who grouped the causative factors of chorea minor into, “first, the age, *i.e.*, later childhood; secondly, the neurotic element (as the family, or overstrain, or a sudden shock or fright), and, lastly, in a large proportion of cases, a blood state, allied to, but not identical with, that which causes acute rheumatism,” a fact nicely supported by the present success which is following the use of aspirin in chorea.

* Read in part before the Philadelphia Pediatric Society on May 10, 1910.

Dr. Hamill and Dr. Posey, in their paper, rather favored rachitis as the chief predisposing cause, and believe that the absorption of toxins, as yet not understood, may have some influence on the etiology.

Henoch at first rather favored the theory that dentition was the disturbing factor causing the malady, but admits later that this has not been proven. He combats Hadden's emphasis on rachitis as the cause, arguing that it is difficult to tell just how much importance to place upon the presence of rickets in children of the poor, when the condition prevails so universally, irrespective of the associated diseases. For instance, infantile scurvy, by such well-known authorities as Ashby and Wright, and others, was considered a form of acute or hemorrhagic rickets, until Barlow and Cheadle pointed out the true etiology and pathology; and even at the present time the condition is mistaken for rheumatism. But that there is good ground for at least assuming some relationship between rickets and spasmus nutans, possibly in lowering the vitality of the infant and so predisposing to the condition, is shown by the fact that 33 out of Thomson's 35 cases gave signs of rickets, and out of Still's 37 cases, 24 were rachitic, with 6 more doubtful. The reasons brought forward against the disorder being entirely due to rickets, are:—

- (1) That the condition (rickets) is present in so many other associated diseases of which it is not the cause.

- (2) That there is not such rapid improvement under antirachitic treatment as in laryngismus, convulsions, tetany and facial irritability (Trousseau's phenomenon).

- (3) It is rare to find it associated with any of these, while they are seldom found unless two or more are present at the same time.

Kassowitz, Schonberg and Hochsinger believe rachitis to be the cause underlying this disease, while Henoch, Hadden and Raudnitz have reported cases which showed no signs of rickets. That the age has to do with the occurrence of the disease need not be disputed. But a few late cases, over three years of age, have been reported, notably one by Still. The usual appearance is between the fourth and fifteenth months, when the coördination of the movements of the head with the eyes is beginning to show some relationship and control. It also, of course, is the beginning time of dentition. As Dr. C. K. Mills suggested, it is easy to appreciate the effect of a dark room and the consequent

eye-strain upon the young child who has acquired certain voluntary and purposive movements of the head and eyeballs, which have not as yet become thoroughly organized and fixed in the psychomotor areas of the brain and so cannot stand the strain to which they have been too early subjected.

In this connection the similarity of miner's nystagmus is rather striking. Nuel and Farnechon and Dransart, and many others, have called attention to the slowly developing condition of nystagmus in coal miners, which is so distressing; and only last month T. Harrison Butler, of the Coventry and Warwickshire Hospital, laid emphasis upon the fact that in no other class of miners is nystagmus developed. He attributes it in part to the glittering black walls of the coal mine, with the reflected, blurred and bad lights of the Davy safety lamps, but believes that the only theory that can explain the disease is a disordered brain and not a straining of the eye muscle, which, moreover, if brought about by fatigue, would produce a tetanic and not a clonic spasm. It is produced by the peculiar work of the miner, the long-continued rhythmic movements of the pick in comparative darkness and in a cramped position.

The relationship of the months of the year to spasmus nutans is interesting. In Thomson's report, with the assistance of Dr. Alex. Buchan, Secretary of the Scottish Meteorological Society, a record of the number of hours of sunshine in the several months of the year was compiled as follows:—

July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
138	145	104	83	49	24	34	57	98	123	165	157

And it was found that in over 80 per cent. of the cases the disease began in the months of December and January. Still's 26 cases agreed with these figures. Out of 38 cases 22 began in the three months of December, January and February, and the two series show 85 per cent. of all cases beginning in the five months from November to March. Still, however, points out that laryngismus stridulus, another nervous disorder, which can hardly have any connection with deficiency of light, has a similar relationship to the winter season.

That a head injury may be the starting point of this condition seems to us to be rather because of the effect of the nervous fright or shock than because of a direct anatomic injury.

Comparatively few cases have been reported in the United

States, and fewer still in France, Spain and Italy. In the year 1909 there were 4 cases seen in all the medical dispensaries of the Children's Hospital in this city, out of some 7,724 cases, of which 62 showed signs of rickets.

I should like to give brief histories of my 4 cases, with 1 additional doubtful case.

CASE I. Dorothy S., a colored girl, was brought to the Children's Medical Dispensary of the Presbyterian Hospital, Philadelphia, on May 13, 1909, aged fourteen months (born February 11, 1908). Her father and mother were living and well. There were two other children living and well, the youngest a month old. Two children had died—one of heart disease and a history pointing to intestinal obstruction, and the other of "summer complaint." The mother has had one miscarriage, and is extremely nervous.

The patient was born at term, was delivered without instruments, was breast fed for only one month, and then given a milk mixture. There was no history of a fall or other injury. The child had had no diseases.

Present Illness.—The mother stated that the child had been shaking her head almost continuously for six months, with marked nystagmus. There was no twitching of any other part of the body. There was no vomiting, no cough. The bowels were constipated, although fairly regular. The child could not stand alone, her legs being very weak.

Physical Examination.—The lungs were apparently O. K.; the heart area, the child lying down, was normal. There was a soft systolic murmur, heard best when lying down, at the pulmonic area, but heard at the apex, and not transmitted. The head was moved slowly from side to side. There seemed to be more rigidity in right sternocleidomastoid muscle, but not a very marked difference. At times the child seemed to keep the left side of her head tilted over toward her left shoulder, and the chin down on that side, but this was not constant. On looking to the right there was a marked nystagmus of the right eye; if toward the left, of the left eye. On closer examination at a subsequent visit there was always at least a faint tremor of each eyeball. The anterior fontanel was wide open.

The child had a pot-belly, diastasis of the recti muscles, a slight umbilical hernia and slight beading of the ribs. Each tibia was very markedly bowed. When seen a year later, in March, 1910,

the rickets was more marked, and, in addition to the nystagmus, the eyes converged. The nodding had almost ceased. The child had several styes during the year. She had eight teeth when two years and one month old, and was not yet able to walk. The blood count, made by Dr. Henry, showed:—

Red blood corpuscles	3,596,000
White blood corpuscles	9,850
Hemoglobin	83 per cent.
Color index	1.05

The differential count showed:—

Polymorphonuclears	32 per cent.
Lymphocytes	62 “ “
Large mononuclears	5 “ “
Transitionals	1 “ “
Eosinophiles	0 “ “
Basophiles	0 “ “

The child was given cod-liver oil, and, later, Bland's pills.

CASE II. Robert J., a colored boy, was brought to the same dispensary on March 4, 1910, aged fifteen months. His father, aged fifty-five, and his mother, twenty-nine years, were living and well. The mother has a marked protruding of the left eye, with a slight twisting of the entire face, although apparently no paralysis, which condition her sister almost exactly duplicates. There were no other children, although there is now a five-weeks-old brother. The mother has had no miscarriages, but says she is very nervous.

The patient was born at term, without instruments, and was not breast fed at all. He was given condensed milk for three weeks, and then Horlick's malted milk for three months, and then cow's milk sterilized (Scott's), and finally all manner of table food. He has had no other illness.

Present Illness.—Had been nodding his head forward and backward and occasionally from side to side for over two months. He had a marked nystagmus of both eyes. He slept well and had a good appetite, the bowels were O. K., and he urinated freely; no cough. He always slept with his mouth open. He could not walk and had his first tooth when ten months old.

Physical Examination.—Fairly well developed child. There was no rachitic rosary. The liver was not palpable. There was a diastasis of the recti muscles. The heart area (lying down) and the sounds were normal. The lungs were apparently O. K. The mouth was always open. He nodded the head from side to side and forward and backward rhythmically. There was a marked nystagmus of both eyeballs. The tonsils were large but pale and clean. There was a slight itchy eruption over right eye. The prepuce was very adherent and was at once stretched.

The blood count showed:—

Hemoglobin	55 per cent.
Red blood corpuscles	4,040,000
White blood corpuscles	16,400

Differential count:—

Polymorphonuclears	41 per cent.
Lymphocytes	55 " "
Large mononuclears	1 " "
Transitionals	1 " "
Eosinophiles	2 " "
Color index .....	.62

The child was given sodium bromide and cod-liver oil at different times, and cow's milk in proper strength.

CASE III. Charles C., aged five years, was brought to the same dispensary on April 13, 1910, with German measles. His father and mother are living and well. Mother says she is very nervous. Father, who has heart disease, has one brother who was at one time in Norristown Insane Asylum. The paternal grandfather is said to have been "queer." Two other children are living, one of whom has a distinctly lowered mentality.

Patient was born at term, easy labor, but only breast-fed for six weeks. He was very weak and thin and poorly nourished and not expected to live for many months. When he was less than three months old he was taken to the country nursery in Chestnut Hill, and came under the care of Mrs. Spodome, who tells me that he then had a nodding of the head, forward and backward, and a marked nystagmus in both eyes. The head nodding was not constant. He had not, at any time, been kept indoors, being, on the contrary, kept out in the sunlight as much as possible. He

never lived in a dark room. When first seen, his anterior fontanel was closed, but the mother says that he was four years old before this occurred. He was anemic looking, but no blood count was made at the dispensary, on account of his r  theln eruption. The prepuce was adherent and was stretched. He kept his mouth open constantly. The heart area, lying down, was from the third rib to just outside the mid-clavicular line to the midsternum. The apex beat was in the fifth space in the mid-clavicular line. There was a rather loud systolic murmur, heard best lying down, above the apex, but heard all over the heart and transmitted into the axilla. The second pulmonic sound was accentuated. The tonsils were very large and red, but clean. There is, perhaps, still a faint trace of the nystagmus (five years after appearance of this condition), but no head nodding can now be detected.

CASE IV. Mary M., colored, aged one year, was first seen in the Children's Medical Dispensary of the Howard Hospital. She was born at term, without instruments, of negro parents, who are both living and are apparently enjoying good health, except that the mother is very nervous. The child has one brother, healthy, and four years old. She was breast-fed for five months, and then was given milk, cream of wheat, bread, etc. Her present illness consisted of an intestinal upset, during very warm weather, from which she recovered rather easily. When seen on January 19, 1911, we noticed a square-shaped head with the anterior fontanel wide open. She made no attempt to walk. The tongue was lightly coated, and there was some enlargement of the tonsils. There was a slight rachitic rosary, and the chest is of the so-called violin-shaped type. There was nystagmus, especially seen in the eye of the side toward which she happened to look. She nodded her head slowly, both forward and backward and from side to side. Her mother said the eyes had only shown nystagmus for a few days; the head nodding preceded this by a few weeks. The child's head was held in the already noted peculiar position, tilted on one side, as if to obtain better fixation of the eyeballs. On inspecting her home, I found the living room to be well lighted, with one window facing the south (on the second floor). On the ground floor the combination kitchen and dining-room was lighted from a small addition with a slanting glass roof, and the light from this roof came through one window into this room. Very frequently in the middle of the day, the child goes next door and plays in a darker room even than this kitchen.

CASE V. Although I believe not a true case of *spasmus nutans*, I shall add the history of the following case, because of its peculiar interest, and because the mother said that the child at one time did nod his head.

James J., aged three years, white, was born to stone-blind parents, the mother having lost her sight when five years old, and the father when six years old, each from an attack of measles. They are both living and well. The mother is exceedingly intelligent and has the most marvellously happy disposition. She is, however, of a high-strung, nervous temperament. One other child, now twenty-three years old, is married, and expects to be confined in a month. Both she and her brother have eyes which have no irides, and she had a cataract removed when twelve years old. A third child died during an attack of measles, complicated with pneumonia, pertussis and spinal meningitis. James was born at term, and breast-fed for only a few months. He has had pertussis. His mother, in answer to a question to that effect, said that he shook his head from side to side when six months old. He now has a marked nystagmus, and at times now, his mother says, there is head-nodding. The child looks out of the corner of his eyes. He, daily, has played in the yard, and lives in a large room with four windows. He came to the Children's Medical Dispensary of the Presbyterian Hospital in July, 1910, suffering from diarrhea, etc., which finally cleared up. On March 9, 1911, he still had some marked nystagmus, but we have never noticed any head nodding, nor have we detected the peculiar tilting of the head in an effort to obtain fixation of the eyeballs.

Three of these 4 cases substantiate the three causative factors upon which Thomson lays especial emphasis. The youngest child first began to nod his head, according to his mother, in November or December last, when about twelve months old. The second child, a colored girl, now aged two years and two months, was first seen to roll her head from side to side in December, 1908, when ten months old. Case 4, also a colored girl, aged eighteen months, began nodding her head in December, 1910. They all four showed signs of rickets, and the first two have each lived, as I personally verified, in a small room, on the ground floor, with one small window, into which the sunlight never finds its way, and where, in each case, daylight can hardly enter; in one instance, because of a high fence, and in the other, because of a high brick wall. The rooms in which Case IV. lived are described above.

The third case, a boy aged nearly six years, who has almost entirely recovered from the condition, did not live in just such surroundings, but even now shows signs of rickets, and although the mother does not remember in what month the nodding spasms commenced, there can be no doubt, from her description of the signs, without any suggestive help on my part that might have been misleading, that her son had the same affection, and the substantiation of a trained nurse makes the diagnosis just so much the more valuable.

In the first 3 cases the nystagmus seemed to outlive the nodding of the head. There has been no impairment of the mentality, and no history of a head injury; but there was, in all 4 cases, the peculiar position of the head, with the attempted side glance, after fixing the position of the eyeballs. The movements of the head depended upon the effort to look in a certain direction. The prognosis in all 4 cases was favorable, in spite of both a neurotic history and a rachitic foundation.

POST-NASAL CATARRH IN CHILDREN. — Eustace Smith (*Lancet*, October 28, 1911) states that of late years he has been in the habit of examining the fauces of all children who have been brought to him suffering from loss of appetite, gastric derangements, spasmodic conditions of the air-tubes, and obstinate coughs. In a very large number of these cases he has found the patient to be suffering from a more or less intense post-nasal catarrh. This catarrh is often confined strictly to the nasopharynx, and does not pass into the nasal passages. While thus limited it may give rise to none of the usual signs of "a cold" in the nose, such as snuffling, sneezing, and external discharge, or even to a throaty quality in the voice. It may therefore remain latent and escape notice for weeks, or even months, together unless the throat be inspected in a good light. Complete loss of appetite is one of the commonest consequences of persistent post-nasal catarrh. Active disturbances of the stomach, laryngismus stridulus, otitis, cervical adenitis, and general infections such as meningitis may all be secondary to post-nasal catarrh. The treatment of this condition consists chiefly in the use of local antiseptic and astringent applications by means of a throat-brush.—*Medical Record*.

A CASE OF CATARRHAL LARYNGITIS REQUIRING INTUBATION.

BY J. T. ULLOM, M.D.,

Germantown, Pa.

In 1904 I reported before the College of Physicians in collaboration with Dr. Musser a case occurring in the practice of Dr. Radcliffe Cheston. The patient was a boy of five, of good family history, who after twenty-four hours of slight indisposition was suddenly seized at 4 A.M. with urgent dyspnea of an obstructive type and died at noon of the same day. In this child there was stridor, great inspiratory dyspnea with cyanosis, hoarseness and evident obstruction in either the larynx or trachea. At autopsy there was found an inflammation involving the larynx and trachea, due to the staphylococcus aureus, and there were two small areas of bronchopneumonia. The thymus gland weighed 40 grams. This was considered a case of status lymphaticus or thymus death.

In 1906 I attended a child, two and one-half years, who had always been fairly robust, in an attack of what was apparently simple catarrhal croup of a severe character. No great alarm was felt, as the child had had attacks of croup before, though never of so severe a character. There was no membrane on the tonsils or pharynx and the child had only obstructive dyspnea, with slight cyanosis and marked hoarseness. The temperature and pulse rate were moderately elevated. At bedtime, after an illness of two days, he was distressed, but not in a serious condition. However, at 1 A.M., he became pulseless, white and unconscious and was only revived by heroic measures. For a time he was easier, but very soon the symptoms recurred with greater intensity; intubation was attempted and was unsuccessful. Later a tracheotomy was attempted, and notwithstanding the fact that the trachea was opened before the child breathed its last, vigorous artificial respiration failed to resuscitate him. At autopsy nothing was found but a thymus weighing 25 grams and a larynx and trachea showing moderate inflammation but no membrane. This was considered a case of thymus death also.

The patient whose history I wish to report to-night is a

brother of the child last spoken of. The father of these two children was subject to attacks of croup as a child and the mother loses her voice frequently with attacks of laryngitis.

At birth the child was well developed and sturdy and showed nothing abnormal but an occasional hoarseness in crying. He had never been seriously ill before. Repeated examinations had shown no dullness over the sternum nor any evidence of enlarged thymus.

On the night of December 27, 1910, he went to bed well. He became croupy in the early morning and was a little croupy all day. He had a fair night, but in the morning was distinctly worse, and toward noon became very much oppressed for breath, with recession of the epigastrium and suprasternal notch, slight cyanosis of lips and finger tips. Temperature ranged from 100° to $102\frac{3}{8}^{\circ}$ F.; respiration, 36 to 40; pulse, 120 to 140. There was no membrane visible in nose, on tonsils or pharynx; prostration was slight, but the dyspnea was distressing. With the history of the child's brother fresh in mind, it was felt that no time could be lost, so, after a consultation between Drs. Griffith, Holmes and myself, it was decided to intubate, which was done at 3 P.M. Relief was immediate and the child had a good night. On the morning of the second day following intubation the child awoke with a temperature of 106° F. and was much choked up and distressed. After considerable coughing and expectoration he was more comfortable, the temperature gradually fell, and by night was in good condition. He passed an uneventful night. The tube was removed the following day toward nightfall and he made an uninterrupted recovery. Bacteriologic examination of the intubation tube showed micrococcus catarrhalis and bacillus subtilis, but no Klebs-Loeffler microorganisms.

Simple laryngitis in a child requiring intubation is decidedly a rarity. To the majority of men, when this case is narrated without detail, it would seem to have been one of unrecognized diphtheria, but we feel sure that such was not the fact. In the first place, the child was very carefully guarded from any infection and came into contact with no other children. Secondly, there was never at any time any membrane, either on the tonsils, the pharyngeal wall or in the nose. Thirdly, the child was not prostrated to the extent usually seen in diphtheria. There was rather a high temperature and the pulse, though high, was never weak. From a clinical standpoint, therefore, we felt justified in

ruling out diphtheria, and the cultural examination proved us to have been right.

The other condition which was in our minds at the time was that of an enlarged thymus. Feeling as we did that the child's brother had died of thymus disease, and with this child suffering, apparently, from the same condition, it was felt, quite naturally, that we had to deal here with a family disease. In the light of what followed, however, it is felt now that in all probability the first child had the same condition as this. At the time, we were between the horns of a dilemma. It was felt that if it were thymus disease intubation would not help. On the other hand, we were afraid to give antitoxin on a provisional diagnosis of diphtheria, because it has been found that cases of thymus disease sometimes die suddenly as a result of the injection of antitoxin. After giving the matter a great deal of thought, it was decided that intubation was our only course. This proved to be right.

I have gone over the literature rather carefully in the search for a case of similar nature and find very few that approach this case. Holt states in his book he was once required to do intubation for catarrhal laryngitis, but neither Rotch nor Still have ever seen this necessity arise. Heady reports being called upon to intubate in a child and found the child dead on his arrival. Nevertheless, he tubed the case, tried artificial respiration, but was unsuccessful. No autopsy was obtained, but careful examination of the pharynx showed no evidence of membrane, and he felt that the case was non-diphtheritic. Taylor reports two intubations in a series of cases of diphtheria intubated in which the bacteriologic examination failed to demonstrate Klebs-Loeffler organisms. He also reports a case in a boy five and one-half years, who had a temperature up to 104°F. and symptoms of croup so severe as to require intubation. In this case streptococci were found. Jacobs reports a case of a woman of thirty-three, who developed laryngitis with membrane in the larynx, not, however, requiring intubation, and in which the bacteriologic examination showed only diplococci and other cocci. He states that up until 1907 only 15 cases had been collected of true membranous inflammation of the larynx without Klebs-Loeffler bacilli. Dr. Schoff, of Media, tells me that he had a case similar to mine with no Klebs-Loeffler bacilli. In this case the tube had to be left in for 15 days. Reports previous to 1883, when the diphtheria

bacillus was discovered, are of no avail because of the confusion existing between false and true croup.

The term "croup" is a very inclusive one. Under this head can be grouped (1) laryngeal diphtheria, (2) catarrhal laryngitis, (3) laryngitis stridulosa, (4) laryngismus stridulus. Croup is not a disease and simply refers to a symptom or group of symptoms. By this we mean the hoarse, barking cough, the inspiratory dyspnea with stridor, which indicates that there is some obstruction in the larynx to the inspiratory act.

The diagnosis between the first three is not an easy one, but there are distinctive features. In diphtheria the child is ill for a day or two before there begins to be croup, and, of course, in the majority of cases, there is membrane on the tonsils or on the pharyngeal wall. Secondly, the child is markedly prostrated and the pulse is rapid and weak, while the temperature is apt to be low. Third, there is a history of exposure. Fourth, primary diphtheria of the larynx is rare.

Laryngitis.—This is apt to be of a sthenic type and the child does not, as a rule, become very ill. There may be fever and it is apt to be higher than diphtheria. There is no membrane on the throat, the pulse is good unless there is great dyspnea and the cultures are negative.

Laryngitis Stridulosa.—This is the name given to that form of croup that comes on suddenly in the night and causes great alarm for a few hours, and the child seems almost ready to suffocate, and then quiets down and goes off to sleep. This seems to be a condition partly catarrhal and partly nervous. It comes often after the slightest exposure and sometimes after a full meal or the ingestion of some indigestible food. It goes as quickly as it comes. There is not much danger of confusing this with diphtheria, for the dyspnea only lasts a short time and the patient is practically well the next day. It can, however, be confused with laryngitis, but the diagnosis is not an important one.

Laryngismus Stridulus.—This is a condition associated with rickets, and in this condition we have an occasional momentary spasm of the glottis with an inspiratory crow or clucking sound. The child gets blue or black in the face and there may be some minutes before it gets its breath; in fact, suffocation is a possibility in this case.

I wish to say a few words here about the condition known as status lymphaticus. This condition is one that undoubtedly exists,

but at present very little is known as to its pathology. Children die that are supposed to be victims of this disease, and autopsy reveals no enlarged thymus. On the other hand, patients are found presenting no symptoms of thymus disease, but showing an enlarged thymus at autopsy. There are a number of cases in literature, however, in which the child presents stridor, hoarseness and inspiratory dyspnea, and in which resection of the thymus gland has given relief. The first case of the kind recorded was reported by Siegel in 1896. The child was two and one-half years old and showed some difficulty in breathing five weeks before admission to the hospital. The operation was a success and the patient recovered.

Ehrhardt's case was in a girl of two years. The condition developed suddenly with fever two months before coming under observation. She had an enlarged thymus, was operated upon and recovered. Morse, of Boston, reports a case with operation, but his proved fatal. Jackson, of Pittsburgh, reported a case in a four-year-old boy. He had a sudden croupy attack which persisted and the stridor and dyspnea became more urgent. Tracheotomy was done, but no relief was afforded until a long canula was used that reached almost to the bifurcation. Every attempt to remove the long canula was followed by urgent dyspnea and the thymus was resected, with complete relief of symptoms. König has reported 2 cases of operation with relief. Purucker's case was in a child of two and one-half years that had had symptoms of obstruction from birth. The thymus was hooked up and sewed to the cervical fascia with recovery. Cases have also been reported in which the use of the Roentgen ray has been followed by recovery. Myers reports a case in a child of eight weeks in which there was crowing respiration and depression of the epigastrium and suprasternal notch on inspiration. The sternum was markedly bowed and there was a mass irregularly quadrilateral in shape, beneath the sternum. Treatment with the X-ray was instituted, and after 47 exposures there was relief of symptoms and a disappearance of the mass.

There seems to be little doubt that there are cases of thymus disease, and this possibility is very disturbing to one confronted with a case of croup that does not yield to ordinary measures.

Another condition has been described by Blackader and Muckleston. This is a stridor due to a congenital narrowing of the glottis and it presents itself shortly after birth. It is heard

only on inspiration, is in the nature of a crow, and becomes more pronounced with excitement. There is no cyanosis or dyspnea. It is present generally only during the waking hours, and usually disappears before the end of the second year.

Thus we see that under the head of croup we have a number of conditions and the responsibility of one who treats a case of croup is very great. I feel very strongly, especially since my experience with this case, that one should not hesitate to do intubation in any case of croup if the symptoms are progressing unfavorably. In skilled hands it is a very simple procedure and can do no harm. If this fails to relieve the symptoms we can turn to tracheotomy, using the long canula, as did Jackson, if the short one does not help, finally doing the resection of the thymus if pressure by that gland can be demonstrated.

ANEMIAS OF NURSINGS.—Finkelstein (*Berlin. Klin. Woch.*, October 9, 1911) states that even apparently healthy babies are often pale, with relatively low hemoglobin values. The latter range from 60 to 70 per cent., the red corpuscles count being high in proportion. Pseudoanemia is the term applied to pallid children with normal blood values. Children are often born with deficient iron in their blood; and if the iron at birth is normal or in excess, this slowly disappears from the organism unless food rich in iron is given. Some authorities claim that under normal circumstances the newly-born child is much richer in iron than is the adult because it is destined to subsist for months on milk, which is poor in iron. There is a so-called chlorotic type of anemia in the nursling which responds readily to iron medication. The hemoglobin in these cases may sink below 50 per cent. The author does not like the term chlorotic anemia and would substitute for it oligosideremia, meaning poverty in iron. This type is doubtless due to congenital insufficiency of the spleen and other blood-making organs. Another type of nursling anemia is the so-called anemia pseudoleukemica infantum, a condition described fully in text-books. In addition to the types just enumerated, which are primary, we have secondary anemias, such as results from syphilis and other constitutional affections, diseases of the gastroenteric organs, etc.—*Medical Record.*

SUMMER DIARRHEA IN INFANTS AND YOUNG CHILDREN.*

BY MARTIN J. SYNNOTT, A.M., M.D.,

Montclair, N. J.

The term "summer diarrhea" is neither scientific nor accurate, because the various forms of gastrointestinal disturbances ordinarily included under it may, and frequently do, occur during other seasons of the year. Their greater prevalence in hot weather is due to causes readily understood. Heat and humidity lessen an infant's vitality and resisting power. The nervous system is impaired. The digestive processes are not so vigorous. Less gastric juice and bile are secreted; and if the food is contaminated, which is more apt to be the case in summer, or if it is of improper quality or quantity, sickness ensues as the natural consequence. Unsanitary surroundings and impure air are predisposing factors frequently encountered among the poor.

In very young infants milk is the principal food. Normal breast milk is practically sterile, and nature evidently intended to provide a germ-free food for nursing infants. For our artificially-fed babies, however, it is impossible to obtain a bacteriologically clean milk. The sources of contamination are so numerous that the task of eliminating impurities from it is almost a hopeless riddle. Until this is solved the problems of the etiology and cure of gastrointestinal diseases will remain complex and involved. Pasteurization and sterilization enable us to destroy the micro-organisms, but the evil is only partially removed thereby, because many other injurious factors must be considered.

That food contamination is the most important factor in gastrointestinal diseases is evidenced by their greater prevalence among the artificially-fed; by their acute onset, often developing during apparently perfect health; by their tremendous increase in hot weather; and by the picture of a severe infection that the clinical symptoms frequently present. The channels of food infection are almost innumerable—flies, insects, manure, hairs from the cows, sweat and dirt from the milkers' hands.

Bacteria thrive in a warm medium, and the body temperature is almost ideal for their multiplication. Their greater prevalence in all summer foods, particularly in cow's milk, explains the frequent occurrence of gastrointestinal disorders during hot weather,

* Read before the New Jersey State Pediatric Society at its Second Annual Meeting, Hotel New Monmouth, Spring Lake, N. J., on Monday, June 12, 1911.

because the presence in large numbers of microorganisms in food is known to exert a disturbing and irritating action in the alimentary canal, causing intestinal fermentation, producing unhealthy secretions, and exciting abnormal functional activity of the mucous and muscular coats of the digestive tract, thus inducing diarrhea.

Add to this the impossible mixtures prescribed by many physicians for bottle-fed babies, containing excessive percentages of fat and sugar and the attempts of many mothers to follow stereotyped formulæ without proper medical guidance, and we need not look long for predisposing causes to gastrointestinal disorders in summer time.

The infrequency of these disorders in the breast-fed infants is due to the fact that a healthy nursing woman's milk is not ordinarily contaminated. Bacteria are, however, found in breast milk in certain pathologic conditions, such as general infections from puerperal processes, severe pneumonia, tuberculosis, and local infections of the glandular substance of the breast, due to fissured nipple, leading to abscess formation. Infectious nutritional disturbances in the nursing infant may arise from such contamination of its food supply. The staphylococcus, streptococcus and coli communis have been demonstrated in healthy breast milk by absorption through dirty nipples.

Prophylaxis.—Milk should be obtained from the best source of supply available. A dairy should be chosen where the cows are carefully selected and examined by a competent veterinarian. The milk should be produced under the conditions laid down by the American Association of Medical Milk Commissions, and should be kept at a temperature of 45°F. or under. If the mother and nurse are careless, or are not properly instructed in the importance of preserving the baby's food at a low temperature, the bacteria present in all milk rapidly multiply and harmful chemical changes take place. Many families of the middle and poorer classes have no ice. Not infrequently the early milkman leaves his bottles of milk standing in the hot morning sun, to remain there until the household is astir, an hour or two later. Then, too, domestics are often careless in caring for the milk; and it is allowed to stand for hours in the warm kitchen atmosphere. During these intervals the bacteria in the milk have been rapidly proliferating; and it is no longer a safe food for the young bottle-fed infant,

In hot weather milk should always be sterilized or pasteurized. For a healthy child pasteurizing is sufficient, while for the child who is already sick with bowel trouble the milk should be thoroughly sterilized. After either process rapid cooling is of great importance, for, if allowed to cool slowly, the remaining spores of the bacteria develop new activity in the warm milk. The results of the writer's clinical experience have taught him conclusively that not to sterilize or pasteurize in hot weather, except in certain specific cases and under the most favorable conditions, leads very regularly to disaster.

Bottles, nipples, cooking utensils and the hands of the mother and nurse should receive scrupulous and painstaking attention. In the nursing mother, the breasts and nipples should be washed thoroughly before each nursing and kept at all times clean and free from contamination.

Babies should be made as cool and comfortable as possible during the hot season. Their clothing should be light and loose-fitting, and should contain little or no wool. In a word, no detail of perfect hygiene should be disregarded.

Erupting teeth, heat rashes, chafed and excoriated buttocks, should receive prompt and efficient attention. Dampness and humidity should be avoided if possible. Hotels, railroad or steamboat travel, picnics, excursions, crowds, automobile rides are all contraindicated for young children and infants. Quiet of mind and body is most important. Frequent sponging and bathing on very hot days adds to the baby's comfort. Water should be given freely, particularly if there is much perspiring and if the urine becomes scant. The diet should be very carefully looked after, and no advances made during an extreme hot spell or during the cutting of teeth. On the contrary, it is often advisable to reduce the food both in quantity and variety at such times, and if the child is taking modified milk to lessen the fat and sugar percentages.

Symptoms.—Attacks of summer diarrhea vary in intensity from the simple case of the child who has had two or three moderately loose movements daily, containing a few or many undigested curds of milk and mucus, without fever or constitutional symptoms, to that of the acutely infected child poisoned with organisms of great activity, with vomiting, profuse diarrhea, pain, hyperpyrexia, prostration, rapid emaciation, algidity and collapse—the much dreaded “cholera infantum.” The bowel evacuations may be serous, indicating the involvement of the small intestine,

or may contain mucus or mucopurulent matter, blood or pus, indicating a colitis or an ileocolitis. Tenesmus may be extreme and almost constant. Convulsions are not infrequent.

The general symptoms, such as fever, rapid pulse and prostration, are due to the absorption of the bacteria or their products through the damaged intestinal mucosa into the lymph and blood channels. These toxic symptoms are secondary to the primary intestinal lesion, and are evidenced by a sudden, sharp rise of temperature, tympanites, or other severe systemic symptoms.

Cystitis, otitis, pyelitis and bronchopneumonia may result as complicating infectious lesions.

Fleeting or prolonged skin affections, polymorphous erythematæ, hemorrhages into the skin and visible mucous membrane are occasionally found.

Meningeal irritation and suppurative inflammations of the serous membranes are not infrequently observed in severe or prolonged cases.

Bacteriology. — Unfortunately bacteriologic investigations, while extremely interesting, are practical only in hospitals having a well-equipped laboratory and an expert pathologist. In private practice, such investigations consume too much time for a busy physician to undertake them personally, even if he has the necessary experience and facilities, while the private laboratory is too expensive for any but the wealthy to patronize.

The normal flora of an infant's intestine have been described by Escherich, Tissier, Moro and others. Shiga, Kruse, Flexner, Holt, Leiner and Jehle have done much to explain the bacteriologic pathology of intestinal disorders. We now recognize many distinct types of ileocolitis and enteritis as of undoubted bacterial origin—such as streptococcus enteritis, staphylococcus enteritis, Shiga bacillus dysentery, pyocyaneus and proteus vulgaris infections. We have also learned that the normal intestinal bacteria, such as the coli communis, may, by taking on an increase of virulence, and by penetrating through the intestinal tissue *intra vitam*, produce active lesions, this phenomenon being the result, perhaps, of food decomposition and the irritative effect upon the intestinal mucosa from the formation of such food decomposition products.

Bacteriologic diagnoses, to be conclusive, must be corroborated by the clinical picture, and attempts should be made to confirm the diagnosis by the demonstration of the suspected bacillus in the

body fluids and in the food supply. In arriving at his conclusions the bacteriologist must find (1) a marked predominance of the suspected organism in the microscopic field, (2) its constant presence in the cultures, and, (3) in the case of streptococcal infections particularly, its presence in the blood, urine and cerebrospinal fluid.

If the pathologist finds an organism not normally indigenous in the healthy intestine, or a marked variation in the expression of those normally present, this is strong presumptive evidence.

The danger from bacteriologic research is that the investigator may become one-sided and view his cases only from the laboratory standpoint, forgetting the important bearing which disturbances in the processes of metabolism have upon the pathology of diseases of nutrition. In searching for obscure factors in the etiology of a given case one must be careful not to overlook very palpable errors in hygiene and diet.

One of the most frequent contaminations of cow's milk is the streptococcus, the result of lesions in the cow's udder, dirt, stable manure or hair. These organisms are a very frequent cause of acute and chronic gastrointestinal disease, such infections resulting usually in an ascending colitis and often producing a general infection through the blood and lymph channels, the microorganisms being found, as already pointed out, in the blood, urine and cerebrospinal fluid.

The bacillus pyocyaneus is not normally present in the intestine, and infections with it have been repeatedly observed. Bright green bowel evacuations, in which the pyocyaneus predominates, is the characteristic symptom. Blue and green colors in variety may be observed in the mucus-filled stools where the large intestine is chiefly involved. General infection does not result from this bacillus, the severe symptoms, when they occur, being due to the formation and absorption of its exoteric products.

The proteus vulgaris is another infection not infrequently seen. It is often the cause of the very acute cases of cholera infantum that we occasionally meet with. Or it may cause only a simple dyspepsia with mild clinical symptoms. It sometimes occurs as a chronic intestinal disease, in which event it may be associated with infantile atrophy. This fact explains the frequency with which this disease occurs in foundling institutions, where it is undoubtedly due to ward infection; and the rapid recoveries often made when the little victims are removed to private homes.

The organism will be found to preponderate in the stools, which are usually clay-colored and foul-smelling.

The spurting diarrheas of the breast-fed infants, of light-yellow with a greenish tinge, often containing a slimy, flocculent substance and small masses of mucus expelled with tenesmus, are caused by staphylococci, which are readily demonstrated in the dejecta. The breast milk has been contaminated by the mother's dirty or infected nipple in the majority of such cases. Absorption has taken place from the skin surrounding the nipple, by way of the latter's collecting ducts.

The infectious nature of certain forms of ileocolitis is clearly proved by the occurrence of epidemics in many localities and in the wards of children's hospitals. The investigations of Shiga, Kruse and Flexner confirm the existence of a specific form of dysentery. The bacilli described by Shiga and Kruse are identical, whereas Flexner's bacillus possesses a certain amount of individuality; but it is probably only a different strain of the same microorganism. An infection by this bacillus produces a severe catarrhal inflammation of the large bowel, with mucous, mucopurulent and purulent, bloody stools. Tenesmus and fever are constantly present. The bacilli are found in the mucous portions of the stools.

Infections are undoubtedly caused at times by pathogenic types of the coli communis, which ubiquitous organism may, under certain conditions, take on increased virulence. In this way its occasional pathogenicity is explained. Rigors and remittent hyperpyrexia, suggesting a malarial condition, are the characteristic symptoms of bacillus coli infections.

Treatment.—With the foregoing facts in mind, it is not difficult to arrive at a rational plan of treatment. This may be summed up under the following heads:—

- (1) Diet; water to be given in abundance.
- (2) Intestinal irrigation.
- (3) Careful nursing.
- (4) Drugs.
- (5) Serum therapy and vaccines.
- (6) Isolation and disinfection, including prophylactic measures to prevent contact infection in others and reinfection of the patient.

Fortunately an accurate differential diagnosis is not essential to successful treatment, except in the case of infectious dysentery,

because the principles involved are the same for all types of gastrointestinal diseases.

(1) *Diet.*—If there is vomiting all food should be withheld for twelve to twenty-four hours, and only sterile water given. During this time barley *water*, not barley *gruel*, may be given, particularly if the mother is apprehensive because food is withdrawn, or if she entertains the belief quite common among the laity that barley is a specific in diarrhea. It makes a good placebo in such cases. The barley grain should be used, not the flour, using a tablespoonful of the washed grains to a pint of water and boiling for fifteen minutes, after which it should be strained through cheesecloth, and enough boiling water poured over the grains through the cheesecloth to replace what boils away. Barley has very little food value, and should never be used with sugar. Sterilized whey, made from fresh skimmed milk with powdered rennet, and diluted if necessary, is usually well borne until such time as milk, carefully modified and absolutely sterile, may be safely resumed. Water should be given freely. If milk is properly adjusted it may be given successfully in nearly every case and no other food is necessary. The reported failures with milk may have been due to its poor quality, to contamination of the supply, imperfect sterilization and refrigeration, or to improper modification. Skimmed milk should be used at the start very largely diluted with water and alkalized with lime water. Later, when the fever subsides and the stools improve, the cream may be cautiously returned and sugar added very gradually until the normal percentages are reached again.

In the breast-fed infant milk may be resumed earlier than in the artificially-fed, but it is a good plan to precede each nursing with sterile water or barley water. It is well to discard the first breast milk by drawing it off mechanically, because, if bacteria are present, they are more apt to be present in the first few mouthfuls. The breasts and nipples should be washed and rendered as aseptic as possible. It is well, also, to avoid the last of the breast milk, which is the richest in fat. Both breasts may be nursed from at each nursing, if this procedure is adopted.

Milk feeding in the bottle-fed should not be resumed until the bowels have been thoroughly emptied by an initial dose of castor oil, saline or calomel. If the movements are loaded with curds it is often desirable to repeat the dose in four or five hours. During this interval sterile warm water may be given freely.

Usually this will be all the infant craves, the normal appetite for food having been replaced for the time being by excessive thirst. In the mild cases improvement is rapid under this treatment, and very often a cure is effected without any medicine other than the cathartic.

(2) *Irrigations.*—In a certain proportion of cases bowel irrigation is of advantage. Every case does not require it, and in some cases it does positive harm. Where the movements are occurring every few minutes, with tenesmus and pain, the rectum is already empty and the introduction of the catheter acts as an irritant to the already inflamed mucous membrane of the bowel. There is increased straining, and rectal eversion or prolapse may follow the procedure. Irrigation is to be resorted to at the onset only in cases where there is no tenesmus, where the movements are infrequent, very offensive in character, contain much undigested food and there are symptoms of ptomaine absorption.

In the case of very nervous children who resist and struggle if irrigations are attempted, it is better to stop this treatment.

Later in the disease, after the acute stage has been passed, irrigations may be resorted to with advantage. A cleansing, sterile salt-solution enema may be given, and this followed by a sterile astringent solution of tannic acid, or emulsion of bismuth. This procedure may be repeated daily or every second day. A starch solution may be used for irrigating purposes, if preferred, and is of advantage oftentimes in relieving tenesmus.

The cases with very severe onset, with vomiting, fever, purging and indications of acute ptomaine absorption, require most prompt and thorough treatment. A delay of even an hour may prove fatal. The stomach should be promptly emptied, the bowels irrigated, and a large dose of castor oil or calomel administered. All food should be withheld, and water given in teaspoonful-doses every fifteen minutes. For the fever, cold packs, cold sponging and, if the condition of the circulation does not contraindicate it, a rectal enema of a pint of water, at a temperature of 60°F., may be given. In collapse a hot saline enema at 105°F. is a valuable and ready stimulant.

(3) *Nursing.*—Careful nursing is of the utmost importance, and quiet and rest in bed is imperative. A firm, kind nurse, experienced in the care of sick children, is essential, because the mother is apt to be over-indulgent and will rarely exert the discipline which is absolutely necessary. In the febrile cases auto-

inoculations of bacteria or their products from the infected intestinal foci are taking place; and any muscular activity on the part of the patient will increase them, thus producing a severe negative phase and hampering nature in her efforts to bring about a condition of immunity.

The anus and buttocks must be kept scrupulously clean, and after each evacuation powdered or oiled. Warm compresses or fomentations to the abdomen are grateful to the patient, and relieve the pain and tenesmus. Occasionally, in the protracted cases, mild counterirritants are an advantage. The writer uses a mixture containing 5 to 10 drops of essential oil of mustard to the ounce of camphor liniment (U. S. P.)

No detail must be overlooked which will add to the comfort of the little sufferer. It should be kept in as cool and dry an atmosphere as possible. Dampness and malarial influences are to be carefully avoided. In extremely hot weather frequent bathing, two or even three times a day, is beneficial, if done with the minimum amount of physical disturbance to the patient.

Every possible source of irritation or annoyance to the child is to be sought for and relieved. Inflamed gums from erupting teeth should be incised and no detail escape the attention of the physician, nurse or mother if the little patient is to make a rapid and unretarded recovery.

(4) *Drugs.*—The drugs to be used in the treatment of the diarrhea are few. After the initial dose of castor oil, calomel or saline (the writer usually prefers the first), no medicine is required in the mildest cases. When the diarrhea continues and there is mucus in the stools, with more or less tenesmus, milk of bismuth is of service.

Opium in any form is to be given with extreme care and in minute doses. To stop the diarrhea suddenly is not our object. Opium will do this temporarily, but the condition of the child is not improved thereby. The temperature rises suddenly, all the secretions and excretions are checked, symptoms of ptomain absorption become rapidly evident, delirium ensues, and the child will die if this plan of treatment is persisted in. Opium should never be administered until the bowels have been cleared of decomposing or undigested food by a brisk cathartic, and it is contraindicated in cases where there is hyperpyrexia. In the protracted afebrile cases it has a limited field of usefulness, but its administration requires the physician's best judgment and it

should be given only by a cautious nurse who has been instructed to recognize the danger signals.

After the acute stage of the trouble has been passed and the movements no longer contain undigested curds or food, but are still loose, watery and frequent, a mild intestinal astringent is of value. Tannalbin, tannate of quinin, and tannigen, alone or combined with subnitrate of bismuth, are valuable drugs when properly administered.

If stimulants are required, whiskey or brandy may be given, well diluted, by the mouth. Hypodermics of strychnin or camphor in olive oil are valuable remedies if the case is sufficiently grave. Strychnin in doses of $\frac{1}{200}$ grain may be given by the mouth two or three times daily as a sustaining tonic and is of value if anorexia is present, as not infrequently happens.

To relieve the tenesmus warm fomentations may be applied to the perineum, or small pieces of ice may be introduced into the rectum and held there with moist gauze or cotton. Suppositories of opium or belladonna are occasionally indicated. The starch water irrigation, previously referred to, with a minute quantity of tincture of opium added, helps to relieve in certain instances.

In exceptional cases, where the pain is so very severe that it becomes a factor in the general collapse, and the measures already indicated fail to relieve, a hypodermic of morphin may have to be resorted to, with proper caution, as the lesser evil.

Sterile saline solution may be administered by hypodermoclysis or intravenous injection in grave cases.

In proteus vulgaris infections Escherich recommends large amounts of sugar of milk or the feeding of fresh cultures of the bacillus lactis aerogenes.

Lactobacilline tablets are of use in certain afebrile and protracted diarrheas with tympanites and other evidences of intestinal putrefaction. Sulphocarbolate of soda is a valuable remedy, also, in this condition.

(5) *Serum Therapy and Vaccines.*—For specific dysentery caused by the Shiga-Kruse bacillus, treatment with an anti-dysenteric serum has been attempted with encouraging results in Europe, and prophylactic immunization by inoculation with bacterial vaccines resorted to in regions where this type of dysentery prevails or is endemic.

The antidysenteric serum in use in the United States is obtained from a horse in which a condition of active immunity has

been induced by inoculations with a vaccine composed of the several strains of the bacillus dysenteriae. The initial dose produces in the horse a profound negative phase and the doses are repeated at seven to ten day intervals, until a rise of temperature is the only response elicited. The inoculations are continued for at least eleven months before a serum of therapeutic value is produced.

The imported Hoechst serum is obtained from a horse which has been immunized by inoculations with a Shiga-Kruse toxin filtrate.

Shiga reports 250 cases treated with this serum in which the mortality averaged only 10 per cent. as against 36 per cent. treated by the ordinary methods.

Early administration is important if the best results are to be obtained from this serum, and if used late large doses are indicated.

In staphylococcal and streptococcal infections autogenous vaccines may be prepared, and in the hands of an experienced immunizator, if used with the proper understanding of their limitations and contraindications, benefit may be expected from intelligent inoculations. Generally speaking, the more severe the symptoms the smaller the dose administered should be.

(6) *Isolation, Disinfection and Prophylaxis*.—We must bear in mind that many types of summer diarrhea are acute bacterial infections and, hence, may be communicable. This fact should be impressed upon mother and nurse by the physician to safeguard other members of the same household, and to prevent reinfection in the infant already ill.

Isolation of the patient, and thorough disinfection of all sick-room implements and accessories (thermometer, sheets, clothing and napkins) is necessary, and the physician should see to it that such precautions are observed.

In the case of nursing mothers, if bacteria are found in the breast milk the baby should be temporarily withdrawn and the nipples and breasts treated with antiseptics, resorting, if necessary, to strenuous agents, such as corrosive sublimate, alcohol and ether. Cracked skin or fissured nipples require, in addition, the application of emollients. If the milk does not rapidly clear up under this treatment, or if the bacteria are found to be due to some constitutional disorder on the part of the mother, rather than to local absorption, the baby should be weaned and fed artificially.

SOCIETY REPORTS.

THE NEW YORK ACADEMY OF MEDICINE—SECTION ON PEDIATRICS.

Stated Meeting, Held November 9, 1911.

WILLIAM SHANNON, M.D., CHAIRMAN.

This was a Joint Meeting with the Philadelphia Pediatric Society and the New England Pediatric Society.

ACUTE DUODENAL INDIGESTION IN CHILDREN.

DR. FRITZ B. TALBOT, Boston, read this paper. He said that most of the knowledge about bile and the effects of the obstruction to the flow of the bile, came from animal experimentation, and there was only a relatively small amount of literature upon the physiology and pathology of bile, which had been applied to infancy and childhood. A resumé of these facts he deemed necessary, and naturally they divided themselves into the physiology of bile, the biochemistry of bile, and its products of decomposition, and the action of bile during digestion.

The composition of bile varied not only in amount but also as regards its composition, as was shown in a table. Bile pigment and salts found their way into the intestine very early in the third month of fetal life. This bile, together with the secretion of the rest of the canal and some desquamated epithelium, formed the meconium. The intestinal canal was sterile at birth but soon became infected and remained so for the rest of life. The bacteria tended to belong to the acid-forming group when the baby was fed with human milk, and to the putrefactive or alkali-forming group when the food was cow's milk. This fact had a bearing upon the chemical changes which bile underwent after it entered the intestinal canal. Bile was excreted from the liver in the form of bilirubin and was changed through oxidation and bacterial action into biliverdin and later hydrobilirubin; this in turn might be converted into leukohydrobilirubin. A considerable part of the bile, which had already performed its part in digestion, was absorbed and carried back to the liver, to be reconverted into bilirubin. Putrefaction commenced when the baby began to take cow's milk, which contained larger quantities of casein than human milk, and thus gave the putrefactive group of bacteria a suitable food to grow upon. It had been proved that urobilinogen could not be formed without the action of bacteria. It was

only present in the urine when bile flowed into the intestinal canal, and was always absent when there was occlusion of bile.

Bile had the property of activating the pancreatic preferment steapsinogen into steapsin. The action of bile upon fat during digestion was not simple. There was much evidence which warranted the statement that the stage of soap formation was necessary for the most efficient absorption of fat. The emulsification of fat was favored by the presence of bile. When bile was occluded from the intestinal canal, absorption of fat was interfered with and metabolism was abnormal.

Most of their knowledge on the effect of obstruction of bile on the metabolism came from animal experiments. Bile had no effect upon the digestion of sugar, but it had been known for a long time that sugars had an unfavorable influence upon patients with acute duodenal indigestion. A possible explanation of this fact was that excessive amounts of sugar might supply a media of growth for the normal fermentative bacteria of the upper gastrointestinal canal; these bacteria might overgrow in suitable surroundings to such an extent that as a result of their activities a secondary irritation of the duodenal mucosa was set up. Starch, on the other hand, was broken down slowly into sugars, so that only a small amount of sugar was set free at a time. Thus, in the first instance, a flood of sugar stimulated the bacteria to intense activity, while, in the second, there was only a dribble, which was absorbed before it could affect the bacteria.

Acute duodenal indigestion was a relatively common disease; during the past year there had been 24 cases in the Children's Medical Out-Patient Department of the Massachusetts General Hospital. The onset of the disease varied; it might be sudden, with fever, vomiting, pain in the stomach, jaundice, clay-colored movements, bile in the urine, loss of appetite, etc.; or it may appear insidious, without fever, following some indiscretion in diet, more especially fats and sugars. An analysis of the cases studied brought out several interesting facts. The disease came as a complication of such infections as otitis media, diphtheria, and the exanthemata in 15 per cent. of the cases. The onset was sudden, with fever and vomiting, in 75 per cent.; the liver was enlarged in 74 per cent. and tender in 13 per cent.; the spleen was not felt in any case. Urobilinogen was absent from the urine in every case where there was complete obstruction to bile and was found in excessive amounts when the obstruction

was removed. The stools were recorded as white in 36 per cent., creamy in 14 per cent., and clay-colored in 50 per cent. of the cases during obstruction. When there was complete obstruction to the common duct, bile in the form of bilirubin was dammed back into the circulation, colored the tissues and a part overspleen was not felt in any case. Urobilinogen was absent from urine because bacterial action on bile was necessary for its formation; this of course only took place in the intestinal canal. The fat in the food was digested and absorbed only in part, and as a result there was a clay-colored acholic stool which was composed almost entirely of fat. In the majority of cases these fats were in the form of soaps. In some cases there was constipation and in others a diarrhea of putrid, rancid stools containing fine mucus. The diarrhea was the result of prolonged irritation of the intestinal mucous membrane, due to the stagnation and decomposition of fat, which was brought about by the action of the intestinal juices and bacteria, thus complicating the duodenal indigestion with a secondary intestinal indigestion. When the bile again flowed into the intestine the fat quickly disappeared and normal quantities of urobilinogen appeared in the urine. Two explanations for this might be given: Either the excessive amounts of urobilinogen were due to excessive putrefaction accompanying the disease plus a diet containing a large amount of meat, or acute duodenal indigestion was not a simple blocking of the common bile duct by mucus. It was conceivable that the agent which caused the plug of mucus to form in the common duct might have extended up into the small bile capillaries of the liver. In that case there would be an obstruction in the liver which would cause urobilinogen to back up and overflow in excessive amounts in the urine.

As to the treatment, metabolism experiments and an understanding of the physiology of bile made it obvious that fat and sugars should be excluded from the diet. Conversely proteins, especially meat, fat-free milk, or skimmed milk, and thoroughly cooked simple starches might be safely given. It was fortunate that the disease was of relatively short duration, since a fat-free diet could not supply the requisite number of calories to sustain health indefinitely. The appetite was always poor and could be best stimulated by tincture of *nux vomica*, in doses corresponding to the age of the patient. Mucus was the natural protective agent of the gastrointestinal canal and was thrown out by the

mucous membrane wherever there was any form of irritant present. They knew that mucus was soluble in alkalies and was precipitated by acids, therefore the mucus plug in the bile duct might be best reached by large doses of alkalies, as, for instance, bicarbonate of soda. The prognosis was always good for life, but recurrences were not infrequent. There was much work to be done by the pathologist before they could know whether acute duodenal indigestion was a purely local disease or one in which the liver tissue itself was involved.

DR. ALFRED FABIAN HESS said he was very much interested in the paper because for some time he had been working in this same field, both clinically and in the laboratory. About one year ago he devised a duodenal tube, a modification of the Gross tube which was used in adults. By means of this tube he could readily reach the duodenum and draw up the juices and make a study of the ferments. Although this worked fairly well, he felt that it could be improved upon, and, some months ago, he found that with a soft rubber Nélaton catheter he was enabled to pass through the cavity of the stomach, through the pylorus, and enter the duodenum. By means of this he more readily and more quickly was able to obtain the duodenal juices. This permitted him to begin the study of the secretions, as well as to study the functions of the pylorus and certain pathologic conditions, such as spasm and stenosis of the pylorus.

In acute catarrhal jaundice they met with one form of duodenal indigestion; the bile was dammed back, there was a lack of fat digestion, and fat appeared in the stools. This was a small part of duodenal digestion, for the duodenum was the main seat of digestion in the intestine, where different ferments were poured into it. When anything interfered with these ferments duodenal indigestion might result. There could be motor indigestion as well as secretory indigestion. Sometimes food passed through the duodenum more quickly than at other times. Where there was interference with bile secretion jaundice did not necessarily result. He had examined one case in which lipase was lacking on two different days; there was marked fat in the stools. He thought this was true at times with amylase. He had seen a case of catarrhal inflammation of the duodenum which, while it did not cause a damming back of the bile, was accompanied by what could be called duodenal indigestion. This question of duodenal indigestion was a broader one than merely its relation to the

secretion and pouring out of bile. The subject Dr. Talbot had brought before them was one that would develop greatly in the future and would be approached not by an examination of the urine and of the ferments in the stools, but by the ferments themselves in the duodenum; this duodenal catheter enabled one to approach this study. They should know more about duodenal indigestion; at the present time they knew comparatively little regarding it.

DR. HERMAN SCHWARZ said that the question of the digestion of fats was a difficult one to solve because they were not sure of what had happened in various parts of the intestine. They had been able to gain some knowledge in their work with animals, and Pavlov and his assistants had helped them. It was a step in the right direction to understand just what duodenal and other kinds of digestion were. Catarrhal jaundice and the effect of the absence of bile upon digestion, especially the digestion of fats, should be studied more, and especially in that type of cases which occurred not so infrequently—congenital stenosis of the bile ducts. In this condition there was absolutely no bile flowing into the intestine, and there was practically no digestion of fats, and in their metabolism experiments it was remarkable to find that instead of 4 or 8 per cent. of fat 60 or 70 per cent. of fat would be found in the stools. Stools with such a high percentage of fat were almost impossible to dry. He recalled one instance in which 89 per cent. of the solid material of a dried stool consisted of fat. He thought it was very important that they should know not only what happened to the fat but also what happened to the other things in addition which fat dragged with it, *i.e.*, the alkalies of Na, K, Mg. and Ca. It was very surprising the amount of fat the small intestine would take up.

DR. HENRY DWIGHT CHAPIN said that one year ago he made a study of the motility of the stomach, especially in atrophic infants. The trouble was not so much with the secretions of the mucosa as with deficient muscular action. He was trying duodenal feeding in that type of cases. He was passing the food directly into the duodenum in that type of cases with deficient gastric motility, and he believed that was a very promising field for future study.

DR. JOHN LOVETT MORSE, of Boston, said that duodenal indigestion was a condition much more common among the younger

children than generally supposed. He had seen a number of babies in which the condition was manifest at the beginning of the first week. One should be on the lookout for it at any age. He was much interested in Dr. Talbot's statement that these patients did not do well when given sugars, but that they did do well when given starches.

A STUDY OF STREPTOCOCCUS ANTIBODIES IN SCARLET FEVER, WITH
SPECIAL REFERENCE TO COMPLEMENT FIXATION REACTIONS.

DR. JOHN ALBERT KOLMER, Philadelphia, read this paper. He said that owing to the fact that scarlet fever had long been known as a contagious disease, it was not surprising that early and persistent attempts were made to discover its exact cause. Many years before the development of bacteriology, investigators believed that a specific contagium was present and searched for it, mainly in the blood, with their crude magnifying lenses. The latest contribution to the bacteriology of scarlet fever was made by Vipond. In his own investigations of the glands in 26 cases of scarlet fever, he failed to find any organism resembling those described by Vipond. Streptococci had received most attention in the researches in scarlet fever. Since 1905 interest had been renewed in this subject by the reports of Russian physicians concerning the efficacy of prophylactic injections of streptococcus bacterins (vaccines) in scarlet fever. If streptococcic immunization did absolutely prevent scarlet fever, then a streptococcus not only bore a close relation to the disease but might be considered the specific cause.

Confident that scarlet fever streptococci did not possess any specific cultural or morphological characteristics, they commenced to study the antibodies of a number of different cultures from various sources, with two main objects in view: First, to determine, if possible, by such a study the relation of streptococci to scarlet fever more accurately than was possible by morphological and biological studies alone. Second, to determine if the method of streptococcus immunization as practiced in Russia could be supported by laboratory investigation. In the experiments made the same cultures and immune sera were used.

In their conclusions they believed that the following deductions were correct:

- (1) A streptococcus produced a specific antibody up to a

certain limit. The specific nature of these antibodies was seen by complement fixation reactions in high dilutions between a streptococcus immune serum and its antigen. With low dilutions, however, the specific nature of the antibody was not brought out.

(2) Not only did scarlet fever streptococci tend to produce their own specific immune serum, but likewise streptococci causing septicemia and that causing non-scarlatinal angina, etc., tended to produce their own immune sera. Therefore, it did not seem any more justifiable to make such a claim for a specific streptococcus causing scarlet fever than for a specific streptococcus causing septicemia and other conditions.

(3) Finding but 11.2 per cent. positive reactions in scarlet fever tended to show that streptococcus infection in scarlet fever severe enough to produce immune bodies was not so common as generally believed. One of the three toxic or malignant cases yielded a positive reaction. These severe cases were frequently due to an overwhelming effect of the true scarlet fever virus, whatever that might be, without secondary streptococcus infection.

Since it had been practically proven that a streptococcus was not the cause of scarlet fever, it was difficult to understand how immunization with streptococci could prevent that disease. They could understand, however, that such immunization might be of value in preventing or mitigating secondary streptococcic infections which were present in at least 11 per cent. of scarlet fever patients and responsible for severe primary lesions and complications. Likewise it was possible that such protection would result by an increase in opsonins against streptococci. The question of method, however, relative to production of opsonins was very important, and accordingly this study had two main objects in view: First, to determine if the streptococco-opsonic index could be raised by an injection of heat-killed streptococci. Since the Russian physicians advised two or three doses of vaccine as a prophylactic their special object was to determine if this number of injections was sufficient to raise the opsonic index. Second, to ascertain whether the opsonins produced by the different strains of streptococci were specific in nature. They offered the following conclusions:

(1) That it was possible to raise the streptococco-opsonic index by the injection of organisms killed by an exposure of 60

C. for one hour. This increase was very slight with three or less administrations and became apparent only after a relatively large number of injections.

(2) The increase in the quantity of opsonin after three injections was so slight as to make the likelihood of establishing immunity against streptococcic infection very dubious.

(3) The opsonins were more or less specific toward the strains used in the process of immunization.

Streptococci stimulated the production of agglutinins; reports of investigations were far from agreeing, and since they had worked with this problem with much interest they thought it would not be amiss to record their results, as follows:

(1) Streptococcus agglutinins were produced slowly by experimental immunization and the quantity was quite variable.

(2) These agglutinins were apparently non-specific in character and of no value in differentiating streptococci.

(3) They were demonstrated in 12.5 per cent. of scarlet fever patients, but only in comparatively low dilution of serum.

(4) There was no relation between agglutination and complement fixation antibodies or between agglutinins and opsonins.

A great deal had been written regarding the relation of streptococci to scarlet fever. They agreed with those who claimed that streptococci found in scarlet fever patients, whether in the throat, suppurative lesions or in the blood, could not be differentiated from the streptococci found normally in the throat or in septic conditions by morphologic or cultural characteristics. While complement-fixation tests had shown a specific antibody for scarlet fever streptococci, this was true only in high dilutions of serum. The same specific relation was readily demonstrated between streptococci causing septicemia and streptococci causing non-scarlatinal sore throat, etc., and their immune sera. Hence if they were to claim a specific streptococcus for scarlet fever, a similar claim might be made for every other streptococcus infection, and to thus claim a specific streptococcus for endocarditis and another for puerperal sepsis, etc., which seemed to be out of the question. One fact was certain, that all severe, septic and fatal cases of scarlet fever were not due to streptococci. They believed that the streptococcus found in scarlet fever belonged to the general class of streptococci and was modified in some way during the course of the infection, so as to give it a somewhat specific antibody and occasionally temporary cultural charac-

teristics. The same was true of streptococci causing septicemia and simple sore throat.

With regard to streptococcus immunization, the reports of Russian physicians concerning the efficacy of injections of streptococcus vaccine as a protective of scarlet fever were on the whole convincing, but the disease was so protean in character, was disseminated so frequently in such an inexplicable and confusing manner, and so little was really understood concerning the infection, that one must review these enthusiastic reports with healthy skepticism.

DR. RICHARD M. SMITH, of Boston, said that the relation of streptococcus to scarlet fever had been the object of careful study for a great many years. The relationship between the two, if, indeed, any such existed, was far from settled at the present time, and the discussion of the matter was still being carried on with much difference of opinion. It had never yet been definitely established that the streptococcus had any direct etiologic connection with scarlet fever. Despite the large amount of work which had been done on the single point of specificity of the streptococcus found in scarlet fever patients it was far from proved that the same type of streptococcus was always found in every case of scarlet fever or that the streptococcus which was found in patients ill with scarlet fever was in reality a streptococcus different from that found in other diseases. The lack of uniformity and consistency in the serum reaction of scarlet fever patients would seem to be another point against the specificity of a single strain of streptococcus. Until this point was definitely proved, namely, that the type of streptococcus found in scarlet fever patients was always the same and different from the streptococci found in other diseases, they must be skeptical in assigning the streptococcus as the cause of the disease.

That streptococci were found in scarlet fever patients no one would think of doubting; that frequently the blood of scarlet fever patients was changed in its reaction toward streptococci seemed equally well established; but these facts did not prove the streptococcus as the etiological factor of the disease. It was a well-known fact that scarlet fever lowered the resistance of the individual to any intercurrent infection; witness the frequency of skin infections, of abscess formation and kidney disease in scarlet fever patients. Tunncliffe had shown that the opsonic

index in scarlet fever patients was low not only for the streptococcus but also for pneumococcus and staphylococcus. It was not surprising that on this non-resistant soil the streptococcus should gain a foothold and develop rapidly, but that this organism was the cause of the initial low resistance and of the primary disease was quite another matter and a contention which it seemed to him was far from established.

The work of the Russians in active immunization against the streptococcus deserved more than a passing consideration. Taken on its face value this work seemed most interesting and important, but they must bear in mind that the natural immunity to scarlet fever was very great. It was not at all uncommon to have a single member in a family affected with scarlet fever and none of the others contract the disease. It was very usual for a single child in a school to have scarlet fever and all the rest escape, even though there was general exposure. He had seen this thing happen twice in a school in which he was interested. In one instance a teacher was in school two days before the rash appeared though she had a sore throat during this time. No children contracted the disease. About one month ago he found a fully developed scarlet fever rash in a pupil who had been in school every day, but none of the other children had the disease. No doubt all could cite similar illustrations. The number of persons, if any, who were actually protected from scarlet fever by vaccines in the Russian communities must always remain a matter of speculation. The use of serum for protective purposes must always be considered very critically for the same reason. The number of inoculated cases must be large, and control individuals many and the observations extend over a long period of time before definite conclusions could be drawn. If it could be proven that vaccination with streptococci did actually prevent scarlet fever as typhoid vaccine prevented typhoid, this fact would be one of the strongest arguments yet advanced for the specific relation of this organism to scarlet fever. It was in hope of stimulating interest in this matter that he reviewed the Russian literature of the subject last year. Since that time relatively few reports on the use of vaccines had been published, most of them coming from Russian sources and confirming previous work. He had had only one opportunity to try this vaccination, but so far as it went his experience coincided with that of Dr. Kolmer. An epidemic of scarlet fever occurred in an in-

stitution in Boston last winter, but despite the fact that all the children were vaccinated, many of them three times, no influence was evident on the spread of the disease. The children contracting the disease did have light cases, but whether or not the vaccination was responsible for this he was unable to say. Thus far it would seem to him that it had not been proven that streptococcus vaccine could prevent scarlet fever.

The value of vaccines and perhaps serum in influencing the complications of scarlet fever, which in the majority of the cases were caused by the streptococcus, was quite another matter. A few individuals were overwhelmed by the toxemia at the onset of scarlet fever. This toxemia was probably due to the specific organism which as yet was not known. The majority of the patients who died, however, succumbed to the toxemia of a secondary infection, due in the majority of cases to the streptococcus. Now, if by giving vaccines or serum early they could prevent these secondary infections or reduce them to a minimum in number and to moderation in severity, they could greatly reduce the mortality of the disease. Or if in those already infected with the streptococcus they could by vaccine or serum increase their powers of resistance and assist them to overcome the infection they could again reduce the number of deaths occurring in this disease. It would seem to him that it was in this direction that they were to hope for most benefit from vaccines and serum and that it was in this direction that their efforts would receive the greatest reward.

DR. WILLIAM C. THRO said that only those who were actually engaged in this work could fully appreciate the tediousness of it and the length of time required. There were many strains and varieties of streptococci. As strain after strain was added to the antigen, more and more positive results were obtained. An increase to eleven strains would give more positive results than when only two or three strains were used.

DR. HOMER F. SWIFT said that the work done demonstrated that streptococci were not etiologic factors in scarlet fever. In any disease with such a specific immunity one would expect the streptococci to give a larger percentage of positive reactions than they obtained. The work recently done with the experimental fever in animals, which was similar to scarlet fever in man, seemed to point to the fact that scarlet fever was caused by a

filterable virus. During the past year they had produced a scar-fever like disease in monkeys, after having first depressed their resistance by injections of saline solution. An experimenter in Berlin had also produced a scarlet fever like disease in monkeys, using the coating of tongues from patients whose lymph nodes were free from streptococci. Then the injection of lymph nodes into monkeys produced after an incubation period fever, coated tongue (the typical strawberry tongue), eruption, which was followed by desquamation similar to that of scarlet fever. He also passed the extract of the glands through filters and obtained scarlet fever like disease in monkeys. He did not obtain similar disease from the injection of streptococci. He thought the disease was caused by a filterable virus.

DR. MATTHIAS NICOLL, JR., said that while the streptococcus as a causative factor in scarlet fever seemed to be losing ground, it must be confessed that up to date the evidence as to the true nature of the infectious principle and the location in the body of those infected was far from convincing, and it should be recognized that unless the discovery of this infectious agent should lead to a means of preventing the disease, that the streptococcus would still have to be largely reckoned with, so intimately and at all stages of scarlet fever was the organism bound up with the symptom-complex. In this country, at any rate, it was the cause of death in the vast majority of the cases. With a considerable experience in the employment of antistreptococcus serum, by the subcutaneous and intravenous method, he was unable to advocate its general use in scarlet fever, except in those cases which might be classed as general septicemia. On the other hand, during the past year, he had thoroughly convinced himself of the great value of its local use when applied freely and at short intervals to the mucous membrane of the pharynx and tonsils. With such treatment the inflamed parts underwent very rapid resolution, while secondary infection of the neighboring lymph nodes and Eustachian tubes was much less likely to occur. This method of treatment was difficult of application, except in adults, older children and tractible infants.

(Dr. Nicoll's further discussion detailed his search for the organism of scarlet fever as reported in the November ARCHIVES, q. v.)

VACCINE INOCULATION, PROPHYLACTIC AND CURATIVE, OF
TYPHOID FEVER.

DR. J. M. PHALEN, Captain U. S. A., and Dr. James G. Callison, New York City, presented this communication. The theory of immunization by bacterial vaccination was nearly as old as the science of bacteriology itself, dating from Pasteur's experiments with the anthrax bacillus in the early eighties of the last century. It was now twenty-five years since Frankel and Simons immunized rabbits against typhoid fever, and fifteen years since Pfeiffer and Tolle and Wright almost simultaneously gave the first inoculation to man. Within the past five years the practice had come into its own, first as a prophylactic measure, and more recently in treatment, and it could be said to have proven its worth in both fields.

Preparation of the vaccine. Of the many types they spoke only of that in use in the United States Army, which was prepared by Major Frederick F. Russell in the laboratory of the Surgeon General's office in Washington. The organism used was an old culture which had ceased to be pathogenic, and which produced an abundant growth upon agar. It was inoculated upon agar in specially constructed flasks giving a known surface of media. After eighteen hours inoculation the agar cultures were washed off with normal salt solution, put into flasks, and the culture killed by subjecting it to 55° or 56° C. over a water bath for one hour. While sterilization was taking place, a count was made of the bacterial suspension for the purpose of standardizing, after which it was diluted with normal salt solution so that 1 c.c. shall contain 1,000,000,000 bacilli; then one-quarter of 1 per cent. tricresol was added. It was tested by bacteriological methods for both aerobic and anaerobic bacteria, and as a further measure of safety inoculations were made into guinea pigs. It was then put up in sealed ampules containing from 1 to 25 c.c.

The immunizing dose of the vaccine was given in three injections at intervals of ten days. The first injection was of 0.5 c.c., while the second and third were 1 c.c. The injection was given with an ordinary hypodermic syringe into the deltoid muscle near its insertion. In military service where large numbers were treated at a time, it was customary to paint the skin with tincture of iodine before the inoculation and to touch the needle wound with the same solution afterward. The reaction follow-

ing the inoculation was usually not severe. Locally there was an area of hyperemia around the wound made by the needle, and more deeply there was a sharply circumscribed area of induration which was somewhat tender. When the deltoid muscle was called into play there was some pain and stiffness. Exceptionally there was some swelling and tenderness of the axillary glands, but no case of suppuration had ever been reported. Sloughing around the site of injection never occurred. An urticarial rash was one of the less common occurrences, and usually involved the chest and abdomen, and might persist for a week or more. Herpes facialis had been reported a few times. Some constitutional disturbances were usual, though frequently entirely absent. This consisted of feverish sensations and malaise in the lighter cases; the more severe reactions showed a moderate fever, chills, slight nausea, profuse perspiration, and some nervous disturbances. The onset of the reaction was usually within six hours, attained its height in twelve hours and subsided in twenty-four hours. The reaction was much more constant and severe after the first injection than after the subsequent ones, though the reaction after the second injection was often the more severe on account of the increased number of bacilli.

The best evidence for the practice of typhoid immunization as from the records of our own army. Up to the present time over 60,000 men had completed the inoculation; among this entire number and covering a period of nearly three years, but 12 cases of typhoid fever had developed and no deaths had occurred. The record of the Manoeuver Division in camp at San Antonio, Tex., during the past summer had been most instructive. An army division having an average strength of 12,800 men, all inoculated, occupied the same camp for four months, from March to July, and in this command but one case of typhoid fever developed. This was a mild case in a hospital corps man, who had not completed the inoculations necessary for protection. Lieutenant-Colonel J. R. Kean, who had recently reported upon this camp, was authority for the report of 49 cases of typhoid fever with 19 deaths for the city of San Antonio for the same four months. During the same period that this camp had existed at San Antonio, between 3,000 and 4,000 men were in camp at Galveston, Tex., and in this command no case of typhoid fever occurred, while the city of Galveston furnished 192 cases of the disease during the existence of the camp. The city and the camp

had the same water, milk and food supply, the only difference being that the camp had been protected by inoculation. About 3,000 men were scattered along the Mexican border, mostly in small camps, many of them in localities where typhoid fever was present, yet only one man contracted the disease, which ended in recovery. Contrast these records of these camps with those of the concentration camps of the Spanish-American War and consider the intimate contact of these camps with typhoid infected cities. It was inconceivable that with such conditions, the practical abolition of typhoid fever could have been effected without the use of the immunizing inoculations.

The important matter of duration of immunity was not yet settled. Firth placed the period of protection after the first immunization at thirty months. Leishman thought that reinoculation should be given after two years. Experience would only clear up this question, and also whether, as in smallpox, the second inoculation would confer practically permanent immunity.

Treatment of typhoid fever by inoculations. This was still in the experimental stage. The total number of cases reported in the literature would probably not exceed 400, but most of those had been observed closely by competent men; the sum of the opinion of these men was unquestionably favorable. It shortened the period of fever and the total duration of the disease; it reduced complications markedly, and also relapses; the mortality of all the cases they had been able to find reported was 4.9 per cent. A distinct crisis, following the second inoculation, was reported by Meakins and Foster, of Montreal, to take place in 50 per cent. of their cases. These men gave the largest doses of the vaccine, from one to two billion bacilli. Very pronounced amelioration of headache, gastrointestinal symptoms and toxemia was usual. It had apparently been directly life-saving in all but the hopeless cases. With increasing confidence the dosage had been increasing, until at the present time it was usually from 100,000,000 to 500,000,000.

The conclusions to be drawn from all this evidence were of a definite character. The case for typhoid immunization, both in the prevention of the disease and in decreasing mortality, was a strong one. It was with reason that the Surgeon-General of the army had given it as his opinion that the protection afforded against typhoid fever would compare favorably with that against small-pox.

THE THERAPEUTIC USE OF VACCINES IN TYPHOID FEVER.

DR. JAMES G. CALLISON said that the therapeutic use of vaccines in typhoid fever was still in the experimental stage. That they had a value, however, was borne out by personal experience, as well as by the testimony of nearly everyone who had reported a series of cases treated by vaccines. The objectors and timid ones were those who had had no experience with the newest curative agent in this malady.

In any intelligent interpretation of results in treating typhoid fever with vaccines, it was necessary to remember the response of living tissue to injections of dead typhoid bacilli. Success or failure must be judged in the light of this knowledge. The production of opsonins and agglutinins following inoculations of vaccines in normal individuals had been carefully worked out by Major F. F. Russell, of the United States Army. This response was quite constant and followed the curve of antibody production resulting from the introduction of any antigen. He had also shown that for a period varying from five to eleven days—an average of eight days—there was no response, no production of opsonins or agglutinins; from that time until about the twenty-fifth day there was a very rapid production of these substances; they were then present in great concentration. This was the result in a normal individual. In the vaccine treatment, if there was to be any effect on the temperature chart, it must come along the lines indicated by the work, for the physiology of the individual or of his component cells was not altered. In other words, an interval of from five to eleven days must intervene between the first inoculation and any production of antibodies in response to that injection. Following this there should be a more rapid drop in the temperature curve when the protective substances produced by the vaccines were added to those produced by the infection present. There would, however, be this difference. The reaction of immunity had already been initiated by the existing infection, and the reaction in response to the vaccination would come more quickly than in a normal individual, and the interval between the inoculation and its response shortened. This point was shown in accompanying charts.

In all, Dr. Callison had treated 35 cases of typhoid fever with vaccines. In these there had been four deaths and one relapse,

with an unusual absence of complications. The causes of death were femoral phlebitis and its sequelæ, a double pneumonia, a meningococcus septicemia, and a ruptured spleen. The conclusions from these statistics, however, should be drawn from the total number of reported cases rather than from an individual series.

THE DIETETIC AND GENERAL MANAGEMENT OF TYPHOID FEVER IN CHILDREN.

DR. CHARLES GILMORE KERLEY read this paper. He found it necessary at the onset of every illness, to discontinue milk and other so-called solid foods for the reason that in every illness in a child the capacity for food was lessened. He gave a laxative to produce a few watery evacuations. As a temporary diet, the child was given flavored gruels and perhaps one of the dried milk foods, until the nature of the illness was determined. In typhoid fever the diagnosis was rarely made under a week of observation. When this diagnosis was established they had an intestine free from distension with gas and undigested milk, and they had consequently a patient less toxic and a lower temperature than would have been the case had freer feeding been allowed. With the diagnosis of typhoid fever he dictated a list of permissible food articles. The diet schedule included gruels, usually two ounces of the gruel to the pint of water, made palatable and with their nutritional value increased by the addition of broths or milk sugar or sherry wine. The cereals were thoroughly cooked. Milk foods were rarely given oftener than once a day. Among those used were matzoon, kumyss, Eiweiss Milch of Finklestein and skimmed milk. The whites of two or three eggs were given daily with orange juice or frozen with orange juice or cane sugar and served in the form of a sherbet. Feedings were never given oftener than at three-hour intervals or less than four hours. The diet schedule for a typhoid fever patient five years of age would be something as follows:

6 A.M. Eight ounces of gruel with sugar or small amounts of broth added. Zwieback or dried bread and butter.

8 A.M. A drink of weak tea with sugar or whites of one or two eggs with sugar in orange juice.

10 A.M. Farina, cream of wheat, rice, served with butter and sugar or maple syrup and butter. Drink of weak tea or kumyss

or matzoon, or perhaps a dried milk food, such as malted milk or Nestle's Food.

2 P.M. Eight ounces of kumyss, matzoon or skimmed milk diluted with gruel. Zwieback; dried bread and butter if wanted.

4 P.M. Orange egg sherbet, or a drink of lemonade or tea and sugar.

6 P.M. Cereal or gruel with sugar and butter or with broth. If skimmed milk has not been given at two o'clock it may be given with gruel at this time.

10 P.M. Gruel with sugar or broth or with wine.

It would be seen that the caloric requirements, 60 to 70 per kilo for the five-year-old child might easily be supplied by the above arrangements of the feeding, although the diet arranged might not be an ideally balanced one. Fat might be given in small amounts when mixed with other foods. Milk, scraped beef and soft boiled eggs were not well borne by young typhoid fever patients and a temporary reduction of protein was not felt by them. Carbohydrates, such as the cereals and the different sugars, were readily cared for when properly prepared and administered. Emaciation was prevented through their action as proteid spacers. In order to have a short and mild case of typhoid fever, the abdomen must be kept flat; on a milk diet tympanites was the rule; on the above diet, it was the exception. Drugs had been of no service except to produce a bowel action when there were not two in twenty-four hours, and to control the evacuation when there were more than four in twenty-four hours. Most children would be perfectly comfortable with a temperature of 104° or slightly over. Under such conditions no attempt at reduction was made. In most cases, restlessness and more or less irritability would appear when it went higher. Then hydrotherapy in the form of the cool pack was used. The child's thorax and abdomen were wrapped in a towel at 95° F. and then the towel cooled by sprinkling with colder water. The advantages claimed by Dr. Kerley for this method of management, briefly outlined, was a milder course, shorter duration, more prompt convalescence and, usually, absence of complications.

DR. CHARLES FIFE, of Philadelphia, said he had not given up entirely the use of milk in feeding children with typhoid fever, although it could be used with damage if carried too far. One should study more the digestive power of a child and not attempt to draw any general conclusions. Milk was still an ele-

ment of food. Skimmed milk had a place in the treatment of typhoid fever; when it was used there was less abdominal distension. It helped the proteid content, a fact that should be kept in mind. The waste and loss of muscle tone should be thought of, but particularly should the loss in nitrogen be kept in mind. Skimmed milk should be used more than once a day.

DR. WARREN COLEMAN said that he would assume in his discussion the metabolism reactions in a child with typhoid fever were the same as in the adult. During the past few seasons he had been using a diet the main object of which was to supply the patient with an amount of food necessary to cover the amount of energy lost. For purpose of comparison he reported on patients in Bellevue and Allied Hospitals during the years 1908, 1909 and 1910.

During these three years there had been 875 cases and 137 deaths. During that same period there had been 102 cases on a high caloric diet with eleven deaths, or 10.8 per cent. If these dietetic cases were subtracted from the total there would be left 773 cases that were not on the high caloric diet, with 126 deaths, or 16.3 per cent.

From the standpoint of the individual patient he brought out certain interesting points. First, the diarrhea. The use of the high caloric diet had been followed by a subsidence of the diarrhea with which the patient entered the hospital. Secondly, in those cases in which hemorrhage had occurred, the loss of blood was very little. They had lost but one case from hemorrhage in their series. Thirdly, the convalescence was much shorter. Dr. Coleman called attention to certain objections that had been made to the high caloric feeding. He thought, however, that high caloric feeding was *the* feeding for typhoid fever patients and was followed by the best results.

DR. AUGUST SEIBERT said that for twenty-two years he had been connected with St. Francis Hospital, and during that time he had not used milk in the treatment of his typhoid fever cases. Diarrhea, toxemia, etc., were increased when milk was given; therefore, milk was not a good food in this disease. His first report on this was published some twenty years ago, and he had published four since, the last appearing in the *Medical Record* three years ago. He emphasized the importance of thoroughly cleansing the alimentary tract; every day he had washed out the bowel.

THE PHILADELPHIA PEDIATRIC SOCIETY.

October 10, 1911.

J. TORRANCE RUGH, M.D., PRESIDENT.

DERMATOLOGICAL DEMONSTRATION.

DR. LEONARD D. FRESCOLN, by invitation, demonstrated microscopic specimens of the causes of various skin diseases. He said that, in cutaneous diseases, as in internal constitutional affections, the keynote to successful management lies in the etiology. Whereas we are still in the dark as to the specific cause of many diseases, as, for example, typhus fever, and are still discussing the etiology of psoriasis, pellagra, rubeola, rubella, variola and varicella, we have found the offending agent in favus, pediculosis, scabies, tinea, equinia, anthrax, actinomycosis, syphilis, etc. Scrapings have been made with a view to determining the cause of measles and chicken-pox without success.

Saprophytic bacteria, moulds and animal parasites enter into the etiology of various skin lesions. We shall only mention streptococci and bacilli of Frehlein in erysipelas; staphylococci in sycosis, acne and furunculosis; tubercle and lepra bacilli; blastomyces fungus; Vincent's organisms on mucous membranes; Klebs-Loeffler bacilli; Dufrey's bacilli in chancroidal infections of skin and mucous membranes; weed-ticks, mower's tick, bot-fly, fleas, mosquitoes, jiggers, bedbugs, and the pediculoides ventricosus, which causes the "straw itch." The last animalcule is recovered from siftings of new mattresses. Several moulds and animalculi were shown, particularly trichophytosis and pediculosis (better termed phthiriasis). The acarus scabiei belongs to the sarcoptes family, is quite small and very difficult to demonstrate. There are various forms of the trichophyton fungus (ringworm), large spore, small spore of Sabourand, microsporon Audouini in ringworm of the scalp, the ectothrix found in the cat. The fungus has many rods with swellings, mycelia and spores, $\frac{1}{1000}$ to $\frac{1}{600}$ of an inch in

diameter. *Microsorion furfur* is the cause of *tinea versicolor*, which is rarer in children. These mycelia are slender and branched and the spores measure $\frac{1}{900}$ to $\frac{1}{300}$ of an inch in diameter. The *achorion Schoenleinii*, the cause of *tinea favosa*, *favus*, was discovered in 1839 by Remak. Quincke and others speak of several varieties. The spores are about $\frac{3}{1000}$ mm. in diameter and may be seen with 300 to 500 diameters. The threads are broader and joints more numerous than in ringworm. Some observers find it difficult to distinguish between them.

Pediculi range from 1 to 3 mm. in length. There are three varieties—pubic louse, the smallest; head louse, the nits of which hatch in three to eight days; and body louse, largest, with nits hatching in about six days.

Slides are generally prepared by mounting the scrapings or hair in 10 per cent. KOH or Liq. Potassii Hydrox. Under the microscope several stained and unstained specimens of these fungi were shown.

DR. FRANK CROZER KNOWLES presented 8 cases—1 extensive vascular nevus, 2 cases of ringworm of the scalp, 4 cases of psoriasis and 1 of urticaria pigmentosa. The vascular nevus shows the excellent result obtained by the application of carbonic acid snow. The infant, four months old, was born with a large vascular nevus involving half of the forehead, the nose and upper lip, including the mucous membrane. The snow, which has a temperature of minus 79°C., was collected in a chamois bag and hardened under pressure into a mold conforming to the area to be treated. Four treatments have been given, varying from ten to fifteen seconds, with fairly firm pressure. The face is almost entirely cured, only three or four very small areas of vascular lesions remaining. The site of the vascular nevus now shows a smooth, thin, white scar.

The two patients exhibited different types of ringworm of the scalp—the non-inflammatory and the inflammatory. The former, *tinea tonsurans*, is caused by the microspore *Audeuini* in this instance; the other, *tinea kerion*, is produced by the large-spored variety of the *trichophyton*. When other remedies fail, the X-ray should be used. A Sabouraud-Noire pastille, being used as the indicator of the correct dosage or a fifteen-minute exposure to the X-rays, should be administered, the tube being fairly soft and eight to ten inches from the area to be treated.

It is unusual to be able to present 4 cases of psoriasis in early childhood, each showing extensive and active eruptions. One is only three years old. Another unusual feature is the occurrence of this condition in a brother and sister, each in the active stage. Out of hundreds of cases of psoriasis, family epidemics, such as here is found, have been absent. All 4 show typical cases in form and distribution.

Urticaria pigmentosa is a rare disease. Dr. Knowles has seen 4 cases in over 20,000 skin eruptions observed during the last nine years. The condition usually starts in early life, being first noticed as a typical attack of urticaria of chronic duration. Pigmentation remains, however, at the site of the attack. Prince Morrow, of New York, has had such a case under observation for over twenty years. In this girl, eight years old, the eruption has lasted eighteen months. She has a number of pigmented spots, sites of former urticaria wheals, on the chest and upper portion of the back, somewhat generalized in distribution. The tendency to wheal formation has practically ceased under careful regulation of the diet and remedies correcting the gastrointestinal symptoms. Wheals, however, can be readily produced by stimulating the skin with a blunt instrument. Itching has been intense, but has been much improved by the application of antipruritic lotions and dusting powders.

DR. WILLIAM PENN VAIL showed 2 cases of scabies. He said that scabies is a widespread parasitic disease, affecting all ages, both sexes, over the entire world. It is seen in dispensary practice in larger numbers than in private work, being the most frequent skin disease seen at the St. Louis Clinic, Paris. It is caused by the presence in the deeper part of the corneal layer of the epiderm of the *sarcoptes scabiei* or *acarus scabiei*, an animal parasite, whitish and shiny in color and rounded. While the female mite is visible to the naked eye, the male is smaller. Females are much more numerous than males, and when fecundated penetrate into the epiderm, making a burrow in which they deposit ova, from 6 or 9 up to 30 in number. The mite cannot retreat because of several bristling hairs projecting from her body; she dies in the burrow; the eggs mature in a few days and the resulting larval forms emerge upon the surface and become sexually active, become impregnated, burrow,

deposit ova and die, and thus the cycle continues. The life of the individual mite is said to be from two to three months. Males live on the surface near the burrows. These are seen as gray lines, which persist after washing, 2 to 3 mm. long, or even several cm. in length. It rarely branches, but often has an undulating, zigzag form, at times like the letter S. The mite is often seen as a mere shining, white area at one end of the burrow. From this point she may be removed with a needle. Ova and dark fecal matter may be seen in the burrow. It is not always easy to find the burrow or to capture the mite, especially when there is much dermatitis, a variety of lesions, or eczema or impetigo also present. A great variety of lesions, papules, vesicles, pustules, crusts and perhaps furuncles, lymphangitis, suppurating adenitis existing side by side, generalized over trunk and limbs is most suggestive of scabies. The location of the multiform lesions aids in the diagnosis, as the mite prefers parts where the skin is thin and soft. Thus the face and scalp of young children are generally exempt. The sites of election are the web and sides of the fingers, wrists, anterior surfaces of the forearm, under the breasts, on the prepuce and glans penis, about the umbilicus, the gluteal region, anterior axillary region dorsum of the feet, about the malleoli, and in children the soles of the feet and palms of the hands. In addition, there is always itching. This is much aggravated at night, when the patient is warmly covered, for this is the time the mite starts to burrow. Scratchmarks, dermatitis and secondary infection follow. Inquiry reveals the presence of a similar case in the family or among the patient's friends. Often an entire family have the disease. For it is transmitted only by contact, direct or indirect. Scabies may be transmitted from horses, cats or dogs to man, but the parasite is of a foreign type and the malady is soon cured by cleanliness and medication. At first there is slight itching; this becomes aggravated, and in two weeks the disease is full blown. Untreated, it continues indefinitely. During a concomitant acute illness the adult parasites seem to die, but the ova develop soon after fever subsides.

In the treatment sulphur is commonly used, 1 to 1½ drams to the ounce of ointment, rubbed in thoroughly after a hot soap and water bath. This is repeated for three more nights, without the preliminary bath; then on the fifth night a second

warm bath is taken. Infected clothing is to be boiled for a half hour or baked in an oven at 120°C. Betanaphthol, balsam of Peru, styrax, Hardy's modification of Helmerich's ointment and Hebra's modification of Wilkinson's ointment have been used with success.

DR. EDWARD F. CORSON showed 3 cases of eczema the most common of all skin diseases. Causative agents are more numerous in children than in adults. Some underlying error in digestion is usually found, with constipation. A rheumatic family history is frequently obtained. The child eats too much and gets too little exercise. Or the character of the food may be at fault. Besides, other skin diseases may have an eczema implanted upon them. External causes may be cold, dryness, heat, strong soaps, hard or ordinary water, chemicals, scratching, irritating discharges, dirt, rough clothing, dyes, etc. The varieties are numerous, according to the type of the lesions. The common sites for the eruption are face, scalp, buttocks, flexures of elbows and knees, forearms and chest. The ears, neck and other parts of the body may become affected. Improvement easily follows appropriate treatment, but relapses are common from fresh alimentary upsets or local causes. Without unremitting care recovery, free from subsequent attacks, is doubtful. The original causes generally bring out the eczema again. Great care in management is most essential. The digestive functions and action of the bowels must be regulated; diet must be watched. Plenty of water should be given and salicylates in those with a rheumatic ancestry. A half dram twice daily of castor oil and aromatic syrup of rhubarb for one or two weeks frequently cures the eczema. Exercise and fresh air in good weather are indicated; also iron and cod-liver oil. Locally, soap and water should not be used, but vaselin or sweet oil. Scratching must be prevented. Locally, boric acid, zinc oxid, bismuth subgallate, phenol, calamine lotion, Lassar's paste, kaolin paste, and many other applications may be employed.

DR. CLARENCE K. DENGLER, by invitation, showed 2 cases of impetigo contagiosa. Impetigo is an acute contagious, auto- and hetero-inoculable skin inflammation, characterized by the formation of discrete superficial rounded or oval vesicles or blëbs, which become pustules, break down and form yellow or

brownish crusts. It is found mainly in poor and unclean children. It may become epidemic from exchange of clothing, common use of towels, etc. It nearly always begins in abrasions, fissures or herpes, and often complicates vaccinations and parasitic diseases accompanied by scratching. About 75 per cent. occur in young children. The first lesion may be a vesicle or pustule, which contains pus and blood corpuscles, epithelial cells and different microorganisms. Crusts soon form, drop off, and the lesions heal without scar formation. Its favorite locations are the face, scalp and about the finger nails. The disease may last two weeks or longer. There is very slight or no itching. Care must be taken to distinguish impetigo from pustular eczema, sycosis, ulcerating syphilides, chicken-pox and ecthyma. The condition is readily cured by washing off the pus and dirt with soap and water after removing crusts with sweet oil; then cleanse with bichlorid of mercury or carbolic acid in weak solution and apply ammoniated mercury ointment, from 10 to 30 grains to the ounce.

BAD RESULTS OF HYPOALIMENTATION IN NURSLINGS.—Luigi Concetti (*Revista di Clin. Ped.*, August, 1910) describes a condition resulting from hypoalimentation which is similar in symptoms to that resulting from too much food, and is often mistaken for it. Vomiting occurs from emptiness of the stomach; the stools are thin, green, and fetid; the child is restless, crying, and sleepless, and death often comes by convulsions. The symptoms only cause the practitioner to lessen the amount of nutrition, diluting the milk still further and filling the stomach with water. The same condition exists in cases in which the mother's milk is deficient in quality or quantity, or the weak child is unable to draw it from a badly formed nipple. All medicines fail to ameliorate the little patient's condition; laxatives, astringents, digestives and calming drugs all fail. Only addition of more nutriment aids the child. The author gives illustrative cases. He uses, in addition to increased nutrition, a solution of the digestive ferments, pepsin, pancreatin and amylase, with lecithin, lactic and hydrochloric acid, in water and alcohol.—*American Journal of Obstetrics.*

CURRENT LITERATURE.

ABSTRACTS IN THIS NUMBER BY

DR. RICHARD M. SMITH.

DR. M. C. PEASE, JR.

DR. C. D. MARTINETTI.

DR. FRITZ B. TALBOT.

DR. J. HERBERT YOUNG.

DISEASES OF EAR, NOSE AND THROAT.

THOMLINSON, W. H.: ADENOIDS. (*Therapeutic Gazette*, 1911, Vol. XXXV., p. 692.)

The author considers that adenoid growths may be divided into two classes—the soft and the hard. The hard forms give uniform symptoms at all times. The soft forms show symptoms of obstruction to respiration with the swelling of each succeeding cold, and this is always worse at night, owing to congestion. Dampness, bad air and poor sanitary conditions predispose to adenoid hypertrophy. The diagnosis is made upon a typical adenoid picture plus digital examination, which gives exact information and is quickly and easily accomplished. For the operation general anesthesia is necessary and ether is the anesthetic to be preferred. The Gottstein curet is the most satisfactory instrument to use. The operation should not be considered complete until the examining finger finds the nasopharynx clear. There are undoubted cases of recurrence, but many so-called return cases are evidences of poor technique in the first operation.

RICHARD M. SMITH.

MEDICINE.

CALICÓ MADERAS, D. J.: VON PIRQUET'S REACTION IN INFANCY. (*La Med. de los Niños*, May, 1911.)

After closely studying over 800 cases the author concludes as follows: The reaction is much more pronounced in infancy than in adults and therefore correspondingly more reliable a test. Tuberculin thus employed should be diluted from 25 to 100 per

cent., avoiding all danger of excessive reaction. Tubercular lungs are much more frequent than is supposed and many a doubtful diagnosis can be made clear by von Pirquet's test.

C. D. MARTINETTI.

DIXON, SAMUEL G.: EPIDEMIOLOGIC AND ETIOLOGIC STUDIES OF ACUTE POLIOMYELITIS IN PENNSYLVANIA. (*American Journal of Diseases of Children*, Vol. II., No. 4, p. 221.)

The author reports the study of epidemic poliomyelitis in 1910; 1,076 cases were reported and 748 of these studied carefully. Observations of previous investigators were in a large measure confirmed and certain interesting additional facts noted. Skin eruptions were recorded in 63 instances; pain was present in 564 cases, and in a very large majority of cases pain was most severe in the area of the body later showing paralysis; 34 cases showed evidence of insect bites. Few cases occurred in different members of the same household, so that danger of transmission from one member of the household to another member is not common. In 9 instances the disease developed in children after having visited communities where the disease was known to be prevalent. The leukocyte count was elevated up to the ninth day of illness. Spinal fluids were studied and a diplococcus grown from the fluid in every instance. Swabbings from the nasopharynx of active cases inoculated in animals failed to produce paralysis. This indicates that the discharge from the nose is possibly not a great source of danger. Stains of blood taken from active cases showed the presence of a small diplococcus. Microorganisms were also found freely in the serum and attached to the side of red blood corpuscles, taken from three monkeys ill with poliomyelitis. Pure cultures of this organism were isolated from the blood of three monkeys. The organism is actively motile, having a single flagellum at one pole. It has no capsule.

RICHARD SMITH.

HODGETTS, C. A.: THE STATISTICS OF INFANTILE PARALYSIS. (*The Canadian Medical Association Journal*, November, 1911, p. 1038.)

Dr. Hodgetts' reports on 658 cases of infantile paralysis occurring in Canada between November 1, 1909, and October 31, 1910; 354 of these were in the province of Ontario, and 187 in

Quebec. There were 46 deaths among the 658 reported cases, which is equal to 7 per cent.; 65 per cent. of the cases were in children under five years old. Of those over twenty years of age there were 43 cases in Canada as against 31 in Boston and only 3 in the New York epidemic. The month of maximum frequency was August; 76 per cent. of the cases occurred during the months of August, September and October. The disease is, however, present during every month of the year, and its prevention is something to be earnestly worked for. M. C. PEASE.

GOODALL, H. W.: METABOLISM STUDIES IN A CASE OF DIABETES INSIPIDUS. (*Boston Medical and Surgical Journal*, November 23, 1911, p. 788.)

Goodall reports a case and its metabolism findings and concludes that polydipsia is the probable primary cause of the neurosis in this particular case, since with the restriction of liquid intake the kidney excretes a more concentrated urine.

That the increased katabolism of the body protein is the result of undernourishment rather than the ingestion of large quantities of water.

FRTZ B. TALBOT.

MENENDEZ, M.: ASPHYXIA NEONATORUM TREATED BY ELECTRICITY. (*Revista de Med. y Cir. Prat.*, July, 1910.)

The author refers to a case of asphyxia in an infant newly born and not cyanotic. All the ordinary methods employed for inducing respiration gave no results. Recourse was had to a faradic current with the anode placed on the sternum and the cathode above the heart. After a brief application regular breathing commenced.

C. D. MARTINETTI.

ALBERTONI, L.: CHANGES IN THE BLOOD FOLLOWING EXTIRPATION OF THE PARATHYROID. (*R. Accad. Sc. dell' Tsifuto di Bologna*, February, 1911.)

Careful analysis shows that total amount of blood decreases even more after extirpation of parathyroid than after a long fast. Muscular tissue especially is deprived of blood. Fibrin increases. In normal days the percentage is 2.51 per thousand grams. After operation it becomes 4.69. In the blood of eclamptic patients Vassale found as much as 9 per thousand,

hence eclampsia might be connected with parathyroid insufficiency. Protein increases from $\frac{1}{2}$ to 1 per cent. Ammonia decreases. Sugar, percentage of water and specific gravity remain unaltered.

C. D. MARTINETTI.

CANNON, W. B.: FACTORS INVOLVED IN THE PRODUCTION OF ARTERIAL BLOOD PRESSURE, PHYSIOLOGICAL AND PATHOLOGICAL. (*Boston Medical and Surgical Journal*, November 2, 1911, p. 672.)

The author concludes that a low pressure may be due not to vasodilation, but to a weak heart; and any agency used to increase vasoconstrictor tone under these circumstances is likely to stop the heart at once. Indeed, my attention has recently been called to a case of precisely this character in which the administration of adrenalin to raise the low tension was followed by instant death—the laboring heart was overburdened by the sudden increase of load and stopped immediately. Until the part played by each of the two factors, therefore—the heart and the arterioles—is clearly discriminated the intelligent treatment of any disturbance of normal arterial pressure is impossible.

FRITZ B. TALBOT.

CURRIE, D. W., AND DRAMWELL, EDWIN: A LOCAL EPIDEMIC OF ACUTE POLIOMYELITIS. (*Edinburgh Medical Journal*, October, 1911, Vol. VII., No. 4, p. 315.)

The authors report a local epidemic of 5 cases of acute poliomyelitis which are of interest from the suggestive data they afford in relation to the incubation period of the disease. These cases all occurred in a farmstead consisting of four houses situated on a private estate some distance from the main thoroughfare and two miles from the nearest town. Children in two of these houses were affected. Three children in one family were taken ill on the 12th, 16th and 18th of September; 2 children in the other family on the 20th and 24th of September. The children in the second family were not directly exposed to the disease, but their mother was in the house in which the 3 children were sick on the 16th, 18th and 19th of September. The original source of infection could not be traced. These observations sug-

gest that the incubation period of the disease, in the case of this local epidemic, was probably four days or less.

Collected statistics show that acute poliomyelitis was more prevalent than usual in various parts of England and Scotland during the autumn of 1910.

J. HERBERT YOUNG.

INFANT FEEDING.

OTT, I., AND SCOTT, J. C.: THE ACTION OF ANIMAL EXTRACTS UPON THE SECRETION OF THE MAMMARY GLAND. (*The Therapeutic Gazette*, October 15, 1911, p. 689.)

Drs. Ott and Scott found that infundibulin starts the flow of milk in about one minute from the beginning of the intravenous injection, and that it reaches its height in four minutes, after which it rapidly falls to normal. They found that the corpus luteum (10 grains), pineal body (5 grains), and the thymus (1 grain) increased the quantity of milk fourfold in five minutes. The ovary minus the corpus luteum had no effect. The amount of butter fat was about the same in the augmented secretion by the thymus, corpus luteum and infundibulin. M. C. PEASE.

MERKLEN, P.: MALNUTRITION IN INFANTS. (*La Ped. Prat.*, 1911, No. 6.)

In pronounced cases of malnutrition, besides the decrease in weight and arrest of development, we usually find the patient much agitated, often emitting loud cries almost continually. When exhausted the infant sinks into a troubled sleep. The number of defecations usually decrease and stools may be lacking in uniformity, of a green color and containing quantities of mucus. Frequently stools, even if watery, cannot be expelled without the aid of enemata. Although not so frequently, constipation may be present. There may be regular vomiting after each feeding. The secretion of urine is considerably reduced, all the tissues become flabby and relaxed, every trace of adipose tissue disappears. An infant subject to malnutrition will nurse slowly with frequent interruptions, does not swallow properly. At times, after many vain attempts to draw milk, the child will cry itself into a state of somnolence. C. D. MARTINETTI.

BOOK REVIEWS.

THE DISEASES OF INFANCY AND CHILDHOOD FOR THE USE OF STUDENTS AND PRACTITIONERS OF MEDICINE. By L. EMMETT HOLT, M.D., SC.D. LL.D., Professor of Diseases of Children in the College of Physicians and Surgeons (Columbia University), New York; Attending Physician to the Babies' and Foundling Hospitals, New York; Corresponding Member of the Gesellschaft für Innerer Medizin und Kinderheilkunde, Vienna, and Honorary Member of the Gesellschaft für Kinderheilkunde, Germany. Assisted by JOHN HOWLAND, A.B., M.D., Professor of Diseases of Children, Washington University, St. Louis; Late Associate in Diseases of Children in the College of Physicians and Surgeons, New York. Sixth edition, fully revised. Pp. 1112. With 240 illustrations, including eight coloured plates. New York and London: D. Appleton & Company, 1911.

The appearance of a new edition of what, without prejudice to other works, must be regarded as the standard text-book in English of the diseases of infancy and childhood is in itself an event worthy of comment in the pages of the ARCHIVES. It has been a characteristic of Dr. Holt's book that throughout its many editions and many reprintings it has been constantly worked over and brought up to date. This its tremendous distribution has made possible in a degree not to be expected in a book of smaller circulation. The present edition, moreover, has been changed in a somewhat more radical fashion than former revisions, and Dr. John Howland, Professor of Diseases of Children in Washington University, St. Louis, has collaborated, and is announced as joint editor with Dr. Holt in the future.

This edition presents itself as an entirely new book, for considerable matter has been eliminated in making room for new,

and new plates have been used throughout, so that practically every page has been changed. Many new illustrations have been introduced and some old ones eliminated. The use of many charts of characteristic temperature curves and the elimination of the picture of the spring baby scale are welcome. As is to be expected, the greatest changes have taken place in the articles upon infant feeding and nutritional problems. Nowhere have we seen a simpler method of obtaining the various milks necessary for infant feeding than the one described here, and it is noteworthy that no richer milk is recommended than a 7 per cent. fat milk, while the advisability of using 2 per cent. and 1 per cent. milks is recognized and provided for. The digestibility of casein is admitted, the uselessness of trying to make cow's milk modifications conform to the percentages in mother's milk plainly stated, and the use of whey and peptonized milk given their proper place of minor importance. Not a great deal of space is given to the discussion of energy requirements and caloric values, but they are treated and the very necessary explanation is made that percentages and calories are merely methods of statement and not methods of feeding as is so often taught by pediatric teachers and so universally accepted by student and practitioner.

Other sections which have undergone major revision are the chapters on pyloric stenosis, peritonitis, endocarditis, and appendicitis. The chapters on cerebrospinal meningitis and other forms of meningitis are quite changed; poliomyelitis is up to date and changes have been made in tuberculosis and hereditary syphilis, in the treatment of the latter of which the use of salvarsan is detailed.

The only drawback to so complete a revision is that it sets aside all previous editions and makes it necessary for every one to obtain the present one. But it would be difficult under any circumstances for one who has the opportunity of looking over this edition to refrain from purchasing it, whether he has ever possessed a previous edition or not. In the opinion of the ARCHIVES a reprinting of this issue will soon be demanded.

CHEMISTRY OF FOOD AND NUTRITION. By HENRY C. SHERMAN, PH.D., Professor in Columbia University. Pp. 355. New York: The Macmillan Company, 1911.

Pediatrists who aim to feed intelligently and to comprehend the normal and abnormal changes which take place within the

digestive tract must be well grounded in physiological chemistry, and well aware of the advances in this branch of science which have been made within the last five or ten years. They cannot make use of tables of caloric values and energy requirements unless they understand what these stand for and why they have been deduced. Similarly with the problems of salt metabolism which are entering now into our conceptions of food requirements. It is the purpose, and we think it is the successful accomplishment of this book of Dr. Sherman's to present all the problems and principles which are related to the chemistry of food and nutrition in a readily understandable form. It must not be inferred by this that the book is in any sense in words of one syllable; it is thoroughly scientific, and although it is as fascinating to read as a novel, it nevertheless requires careful application. For all who are interested in these matters, and particularly the man of good education whose familiarity with these problems is not great, we know of no better book.

BIBLIOGRAPHY.

A MOTHER'S GUIDE. A MANUAL FOR THE GUIDANCE OF MOTHERS AND NURSES. By FRANCIS TWEDDELL, M.D., Alumnus of Bellevue Hospital, New York, Fellow of the New York Academy of Medicine, Assistant Physician to the Babies' Hospital Dispensary, New York. New York: James T. Dougherty, 1911.

This is an excellent little book and for its size surprisingly complete. In fact it is crammed full of needful advice and instruction and the author seems to have eliminated all irrelevant material. The appearance of the book is attractive, the form convenient and the arrangement logical. It is one of those books of which we have often said that there cannot be too many, and unlike some which have appeared, this book of Dr. Tweddell's has been so carefully and sanely done that we can recommend it heartily to all mothers and predict a wide field of usefulness for it.



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